Vol. XLIX

APRIL 11th, 1946

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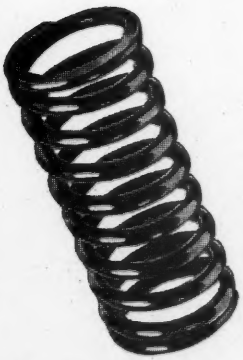

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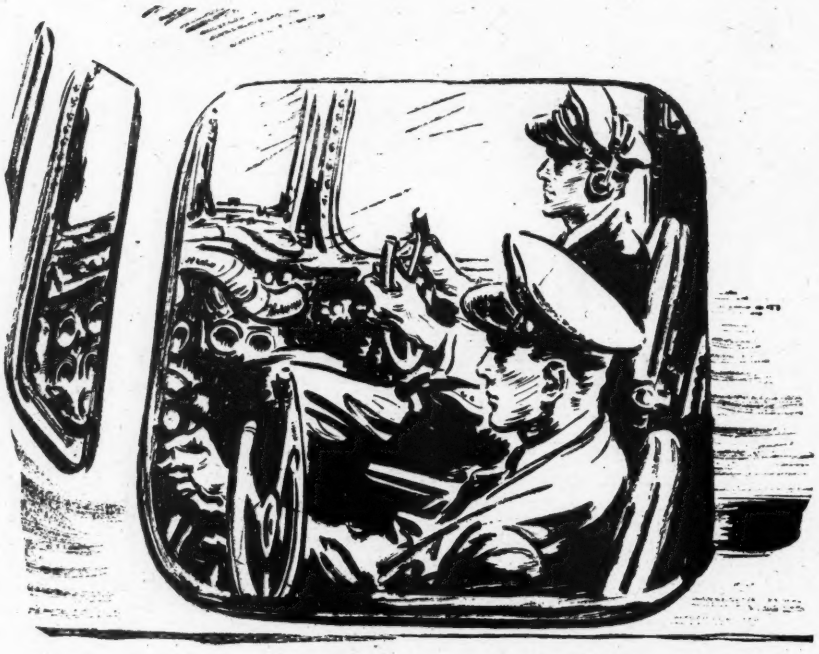

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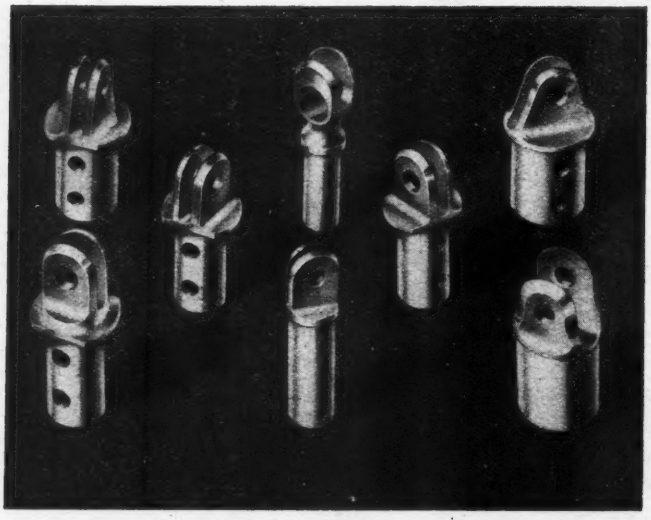

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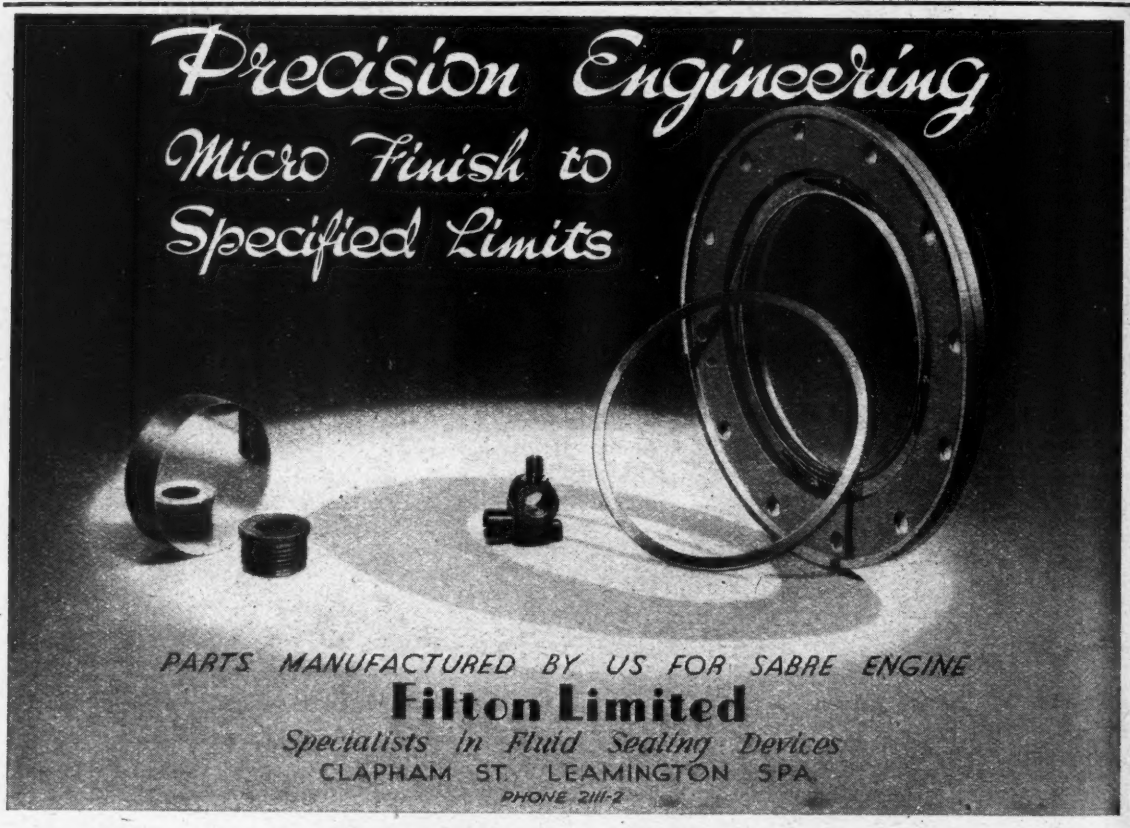

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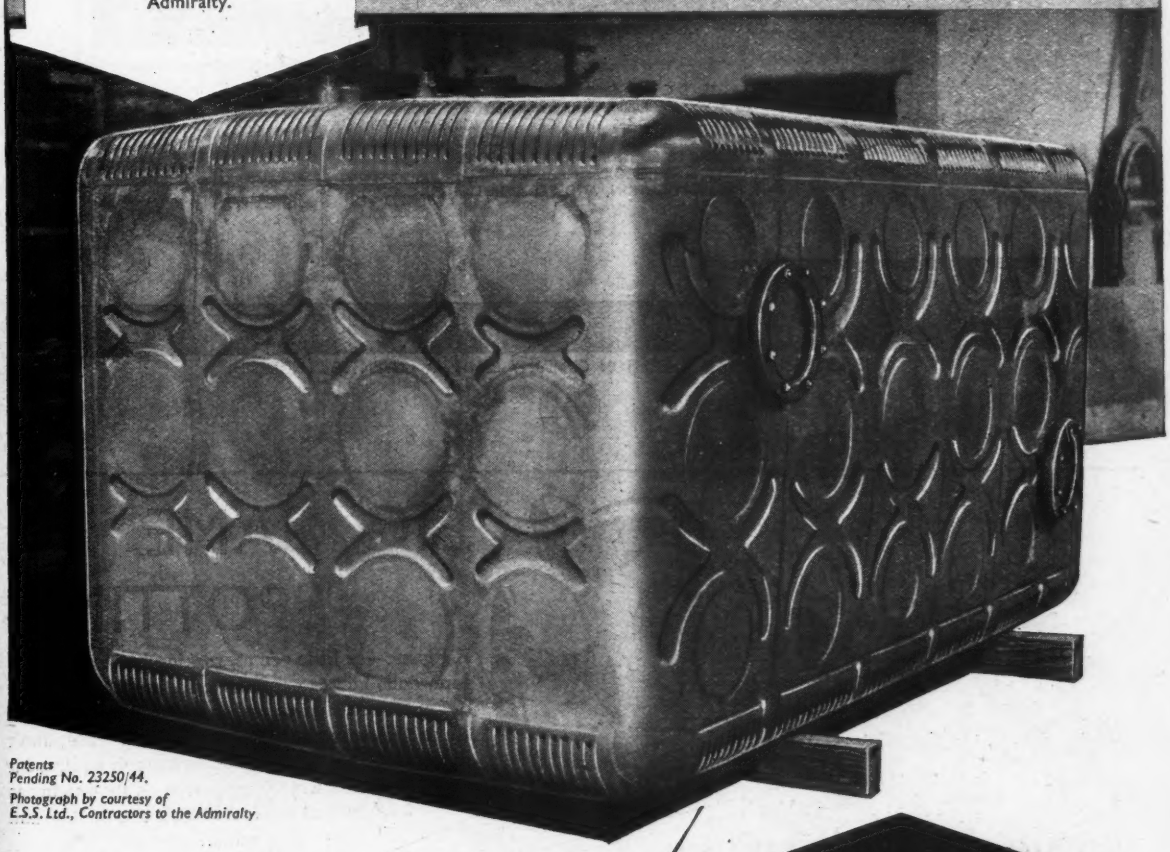

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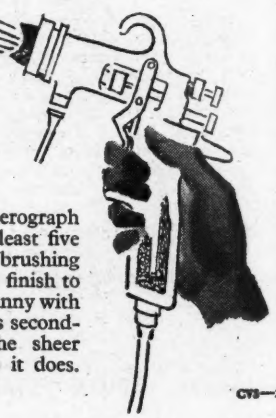

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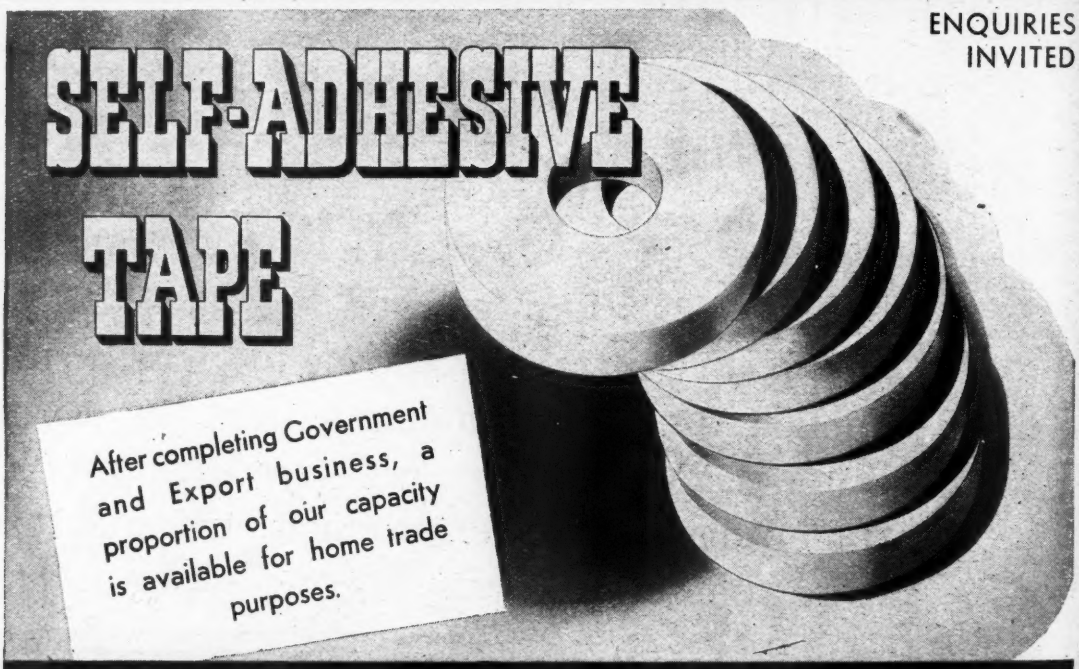

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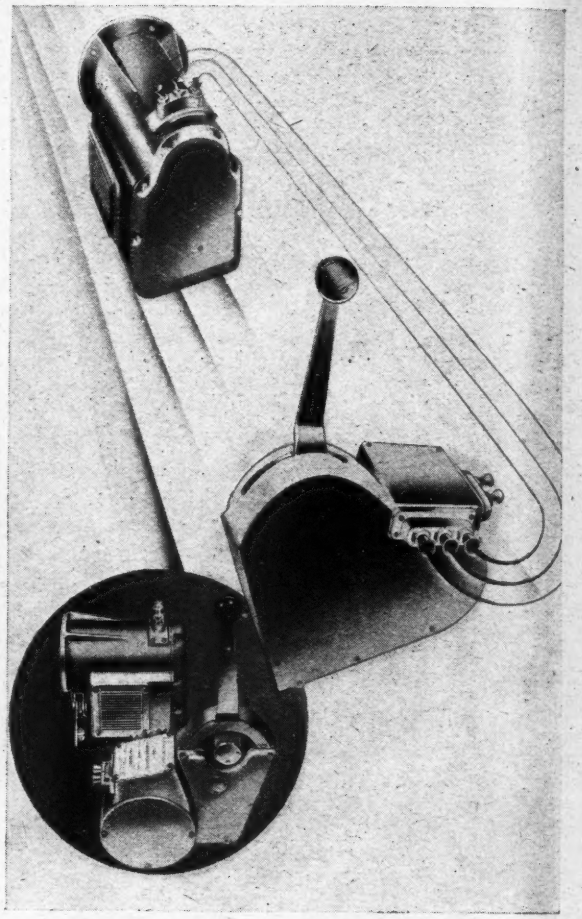

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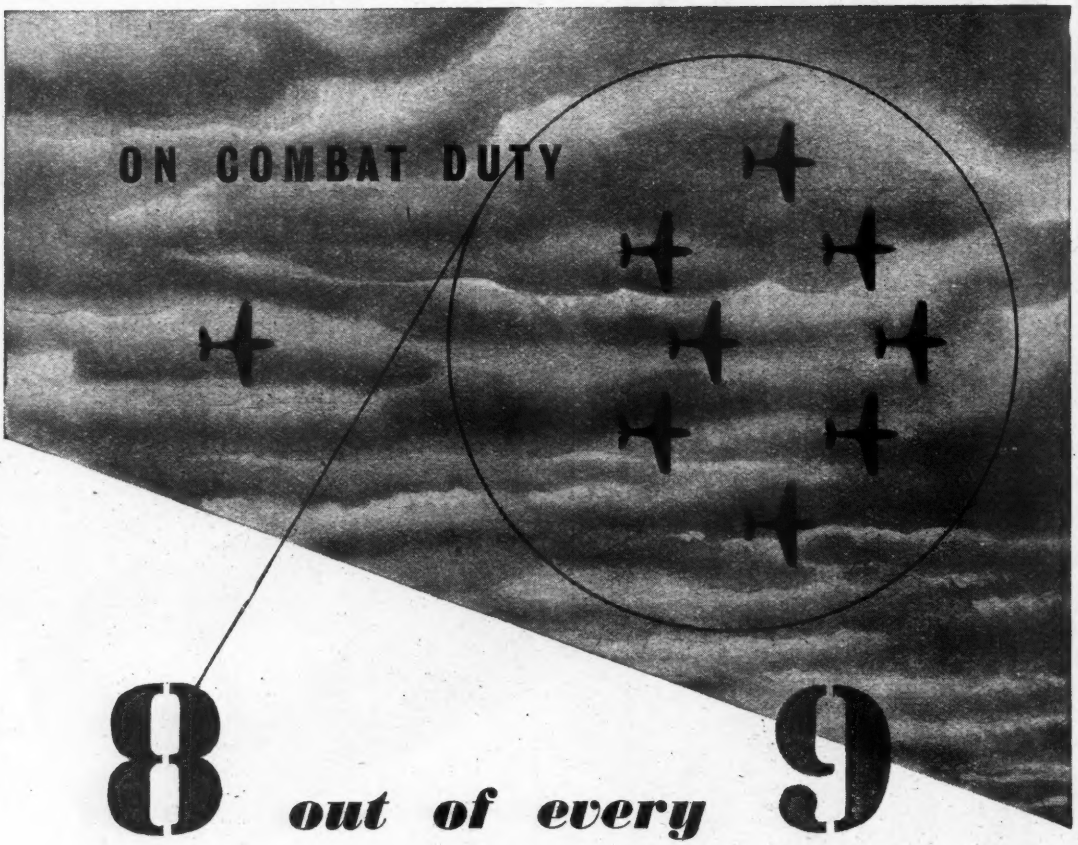

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The Outlook

The Channel Affair

WHEN, in February, 1942, the German battle cruisers *Scharnhorst* and *Gneisenau*, and the heavy cruiser *Prinz Eugen*, escaped from Brest and got safely through the English Channel on their way to Germany, the question asked on all sides was "What were the Admiralty and Air Ministry doing?" The reply has now been given by the report of the board of inquiry set up to investigate the circumstances. The board was composed of Lord Justice Bucknill, Air Chief Marshal Sir Edgar Ludlow-Hewitt, and Admiral Sir Hugh Binney, and the report reveals an extraordinary set of circumstances which account, in part at any rate, for the fact that the German warships managed to get through the Channel.

It had been foreseen that an attempt would be made, and as early as April 1941 a plan had been worked out by the Admiralty and the Air Ministry. It had, however, been assumed that the attempt would be made on a dark night, whereas in the event it took place in daylight, but with low cloud and poor visibility. Even so, the patrols of Coastal Command might well have spotted the German ships but for the breakdown of the A.S.V. equipment in the first aircraft sent out. As an oversimplification one might say that the Germans owed their escape to the blowing of a fuse, for it is at least conceivable that had the equipment been working, the ships would have been spotted.

That argument, however, would presuppose that we had the necessary forces available if earlier warning had been given, and the report makes it clear that our forces were weak. It is pertinent to ask if, supposing that the first Coastal Command patrol *had* spotted the warships, there could have been on the scene anything better than the Swordfish for making the attack. The loss of time amounted to but some three hours, scarcely sufficient to have made a vital difference. We think it fair to assess the failure to locate the ships earlier as a contributory cause only.

It is scarcely surprising that the fighters sent out as escorts to the Swordfish had little chance of being of material assistance in the weather conditions obtaining and especially bearing in mind that the top speed of the Swordfish was not very much greater than the stalling speed of the fighters. Had the Fleet Air Arm had better torpedo planes the story might have been very different.

Altogether the report does not take us very much further. There is little doubt that the liaison between the services was not all it might and should have been, but since the German warships were much less of a menace after their return to Germany than they were while at Brest, it does not appear to matter very much, except from a prestige point of view, that they got through. The most regrettable aspect is the futile sacrifice of the lives of the gallant crews who set out on that vain attempt to cripple the German ships. None of them returned.

The Air Estimates

TEN years ago the gross value of the Air Estimates was £43,490,600. In 1939, the last to be published before the outbreak of war, the figure had risen to £220,626,700. This year's Air Estimates reach a gross value of £276,826,600. But this figure does not represent anything like the final total; for one thing, the vote for what used to be termed "Technical and Warlike Stores," in other words aircraft, engines, spares, armament, ammunition and the like, is not included in the 1946 Estimates but will be provided for in the Ministry of Supply vote of the Civil Estimates. The same applies to the amount to be set aside for aeronautical research. And Civil Aviation, which used to have a vote all to itself (Vote 8), is missing altogether and has a nice fat Bill all to itself.

So one way and another, the Air Estimates are very

far from telling the whole story. In the main there does not appear to be anything much in them calling for special comment. Certainly no one would quarrel with the pay of officers and airmen, but that it should cost £3¼ million for the Air Ministry to control a total personnel of 760,000 in the R.A.F. may seem rather surprising, especially as the number is expected to fall to 305,000 by the end of the year.

In view of the vast importance which Government spokesmen have said they attach to the reserve and auxiliary forces, the sums to be devoted to these forces appear woefully inadequate, a mere £350,000 in all for the R.A.F., R.A.F.V.R., A.A.F. and A.T.C. The figures themselves, and the explanatory notes on them, smack too much of "doing it on the cheap." No one wants to see extravagance at a time like the present, but cheeseparing at this end of the R.A.F. is not likely to be wise policy.

"The Minister Will be Empowered . . ."

WHETHER or not one is a supporter of any general policy of nationalization, it does seem, on reading through the new Civil Aviation Bill, that altogether excessive powers are to be invested in the Government and in the person of the Minister of Civil Aviation himself. There is little doubt that, for the moment, the autocracy will be quite benevolent, but, once the Bill has been passed and made into law, the field is laid wide open. At any day in the more distant future the Bill will permit the use of extreme powers in the maintenance of the privileged position of the Government Corporations. One understands the need, in wording such a Bill, to provide for all possible contingencies, but the price seems to us to be too high.

Actual and prospective private operators in the "open" charter sphere will at present, no doubt, receive fair treatment and even benevolent consideration. They can go ahead in the knowledge that their operations, if legally permissible, will be unrestricted. But this freedom seems to be almost entirely dependent on the Minister's current opinion of the situation. In his Press Conference last week, Lord Winster made it clear that, while being more than benevolently inclined towards independent operators, he would not tolerate anything suggestive of "pirate" activities.

The Bill itself is clearly and adequately worded, and can provide few possibilities of misunderstanding.

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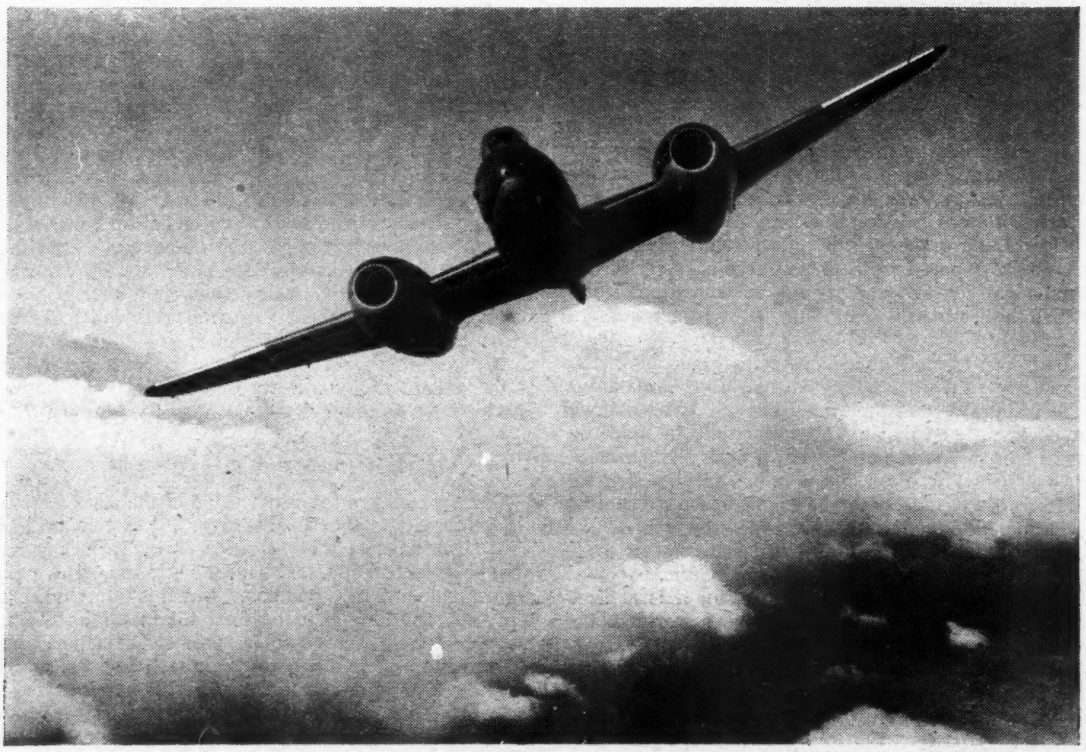


EFFICIENCY EXPRESSED: The old-established term "power loading" is gradually giving way in design terminology to the new expression "thrust/weight ratio." For the Mark IV Gloster Meteor the ratio is 0.5 and accounts for the phenomenal climbing powers of this newest R.A.F. interceptor, which can be in action at 30,000 feet five minutes after take-off. With its twin Rolls-Royce Derwent V turbine jets the Service-type Meteor IV differs little from the 606 m p.h. *Britannia* and stands pre-eminent among the world's fighting aircraft.

Airspeed

Consul

The AS-65 Transport : An Oxford Conversion Modified : Handling Qualities

DURING and immediately prior to the war a total of rather more than eight thousand Airspeed Oxfords were built, and this type of aircraft was, of course, the R.A.F.'s standard twin trainer. Not unnaturally, since this is the season of "interim" types, the Oxford has now been modified for civil use and has been re-named the Consul.

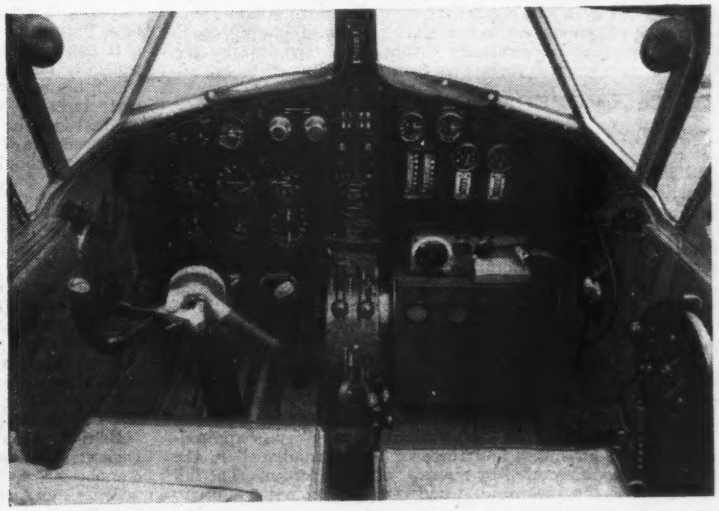
In standard form this new feeder-line aircraft carries a crew of two—consisting of a pilot and a radio operator who uses the seat previously occupied by the instructor—five passengers and their baggage. With this arrangement the Consul is carrying the equivalent of 1,020 lb of payload, with which it has a range of 590 miles at 155 m.p.h. and 10,000 ft. By reducing the total payload to 644 lb. this range can be increased, at the same speed, to 856 miles.

Pupils, instructors and others will have detailed memories of the flying qualities of the Oxford; these, though perfectly normal when airborne at reasonable loadings, were such that a fair degree of skill was required if the hold-off, landing and subsequent ground run were to be "tidy." Naturally enough, even a series of flying qualities difficult only to the novice are neither necessary nor desirable in any transport type, and during the conversion from Oxford to Consul the setting of the tail-plane was, we learn, altered, and other small modifications were made to improve the handling qualities and to make the aircraft more normally "c.g. conscious." Since its predecessor was designed solely for Service training, the Consul has natural strength factors which are considerably higher than those required by the Air Registration Board.

The standard five passenger seats in the Consul are separated from the crew's compartment by a bulkhead with double doors, and the Oxford ventilating and heating system has been modified so that each passenger has individual control of the local atmospheric situation.

As in the case of the Oxford, the Consul is powered by two Armstrong Siddeley Cheetah X engines, and Fairey Reed fixed-pitch metal airscrews have been standardised. These engines are moderately supercharged, and have a maximum rating of 375 b.h.p. at 2,435 r.p.m. at 6,000 ft. They give the Consul a sea-level maximum of 169 m.p.h. and a figure of 184 m.p.h. at 8,000 ft. The maximum cruising speed is 172 m.p.h. at 7,700 ft., and the best economical cruising speed is given as being 129 m.p.h. at 10,000 ft.

Structurally, the Consul is, except for the minor modifications to which reference has already been made, entirely similar to its predecessor.



Although designed in pre-1939 days, the Consul's control and instrument layout can still give points to aircraft designers.

FROM ALL QUARTERS

A FAIREY GYRODYNE

Building of Helicopter Announced

FIRST official disclosure of the fact that the Fairey Aviation Co., Ltd., is building rotating-wing aircraft was made in the chairman's speech on April 3rd, but our readers may possibly have guessed as much from the publication, in our issue of February 28th, of a picture of Sqn. Ldr. B. H. Arkell in the cockpit of a Sikorsky, and the statement that he had joined the Fairey company as test pilot. Sqn. Ldr. Arkell was O.C. of the R.A.F. Helicopter Training School at Andover, an article on which we published on July 5th last year.

Development in helicopters is apt to be slow, and one may, therefore, assume that it will be some time before the Fairey makes its first flight. That a very useful team has been collected is evident from the fact that Doctor J. A. J. Bennett has joined the firm's engineering division. Dr. Bennett was, it may be remembered, on the technical staff of J. and G. Weir and the Cierva Autogiro Company, where his mathematical genius assisted materially in elucidating the very complex problems of rotating wings. Another former member of the Cierva staff who has joined the Fairey Aviation Company is Wing Commander R. A. C. Brie, who, in addition to being an expert pilot of rotating-wing aircraft, has been preaching with eloquence the gospel of that type of flying machine for a great many years.

Of the machine itself nothing may be said at the moment, but with such a staff of experts in addition to the Fairey "fixed-wing" technicians, one may hope for great things.

NEW BEECHCRAFT

THE specification for the new four-engined Beechcraft, which is said to have engines of approximately 350 h.p. buried in the wings, also calls for a take-off on three engines in 2,000 feet over the 50-foot screen. Cruising speed is said to be about 190 m.p.h., but full details have not yet been published.

QUEUE FOR GLIDING

THE London Gliding Club has a waiting list for new members. "No more new members can be accepted until we receive more machines," Sqn. Ldr. J. R. Ashwell-Cooke, the club's secretary, said recently.

"Before the war we were the largest gliding club in Europe. Our buildings and clubhouse, taken over as P.o.W. camps in 1940, have not been derequisitioned. As soon as we get them back we can further our expansion.

"We have seven new machines on order for the summer," he added. "At the beginning of the year we decided to limit new membership to 50, but now, as we receive new training machines, so we admit applicants from the waiting list. Membership applications are considerable, because gliding looks like maintaining its popularity which was interrupted by the war." Before the war there were over 100 gliding clubs.

"OPERATION BULLSEYE"

SEVENTY-ONE Lancasters and 17 Mosquitoes, each carrying a single 500 lb bomb, took part in the bombing of Heligoland last week-end. Known as "Operation Bullseye," the occasion was primarily an exercise and included interception by "enemy fighters" provided by B.A.F.O. from airfields in Germany. However, as the raiders' targets were ex-enemy naval installations on this once fortified island—the Gibraltar of the North Sea, the Germans called it—the live ammunition used was put to a practical purpose and very little now remains of what was once a formidable German naval base. Later it is proposed to carry out an exercise with 10-ton bombs on the surviving submarine pens there.

The operation lasted for about five hours; take-off was dusk and most of the bombers were back at their respective bases shortly after midnight. No fewer than 21 squadrons of Bomber Command were represented by the 88 aircraft taking part.

The distance flown on "Operation Bullseye" was approximately 1,000 air miles, and three or four "combats" in the target area were reported by aircrews on their return. The full official report on the exercise had not been completed up to the time of going to press.

G.A.P.A.N. REUNION

The Guild's Annual Dinner

ALTHOUGH described as an "annual dinner," the Guild of Air Pilots and Air Navigators' party last Thursday was, for all the members and guests, very much a happy reunion after six years of war. Never can so many pilots and other members and guests have met so many friends at one time and place after so long.

As in pre-war years the function was "formally informal," and there was ample opportunity for reminiscence and general conversation both before and after the more official dinner and speechmaking period. Even the speeches were delightfully "free" in spite of—or perhaps because of—the august presence of the Minister for Air as the principal guest. The Marquess of Londonderry, who is Master of the Guild, was in the chair, but, after a few brief opening sentences, he left the field to the other speakers, led by Air Vice-Marshal Bennett.

Of course, this was a heaven-sent opportunity for civil aviation attack and defence, and the opportunity was duly taken by the Deputy Master—who spoke of air transport as a mere football in the political game—and by Mr. Francis Chichester, who was pointedly and sometimes even acidly entertaining in his comments. By contrast, Lord Winster and Mr. Ivor Thomas nimbly avoided the respective baits, and spoke enthusiastically both of their work and of the future of civil aviation, stressing the importance of men rather than measures. Sir Harold Hartley also spoke wittily and usefully for the guests.

MR. FRISE RESIGNS

LAST week the Bristol Aeroplane Co., Ltd., announced that Mr. L. G. Frise, for many years chief engineer of the company's aircraft division and lately its adviser on aeronautical engineering, had resigned on the ground of ill health. Everyone in British aviation will hope that a well-earned rest will restore his health, and that for many years to come his wealth of experience will be available to the aircraft industry.

Mr. Frise has been with the Bristol company for a great many years. As second in command to Capt. Frank Barnwell he had much to do with earlier Bristol types. When Capt. Barnwell was killed in a flying accident on a little single-seater light aircraft of his own design, Mr. Frise became chief designer. The series of outstanding Bristols, from Blenheims through Beauforts, Beaufighters and others to the Brabazon I, Freighter and Wayfarer, bear testimony to his ability. The more recent types were, of course, designed after Mr. Frise became chief engineer, having been succeeded as chief designer by Mr. A. E. Russell, but the many problems inevitably associated with an aircraft so ambitious as the Brabazon I must have imposed a heavy strain on Mr. Frise.

It can probably be said that the name Frise first became generally known many years ago through the type of aileron which bears his name. This has been used extensively on aircraft built by other firms, and is still in use either in its original form or some variant thereof. We trust that Mr. Frise has been drawing some very substantial royalties from his design—or should it be invention?

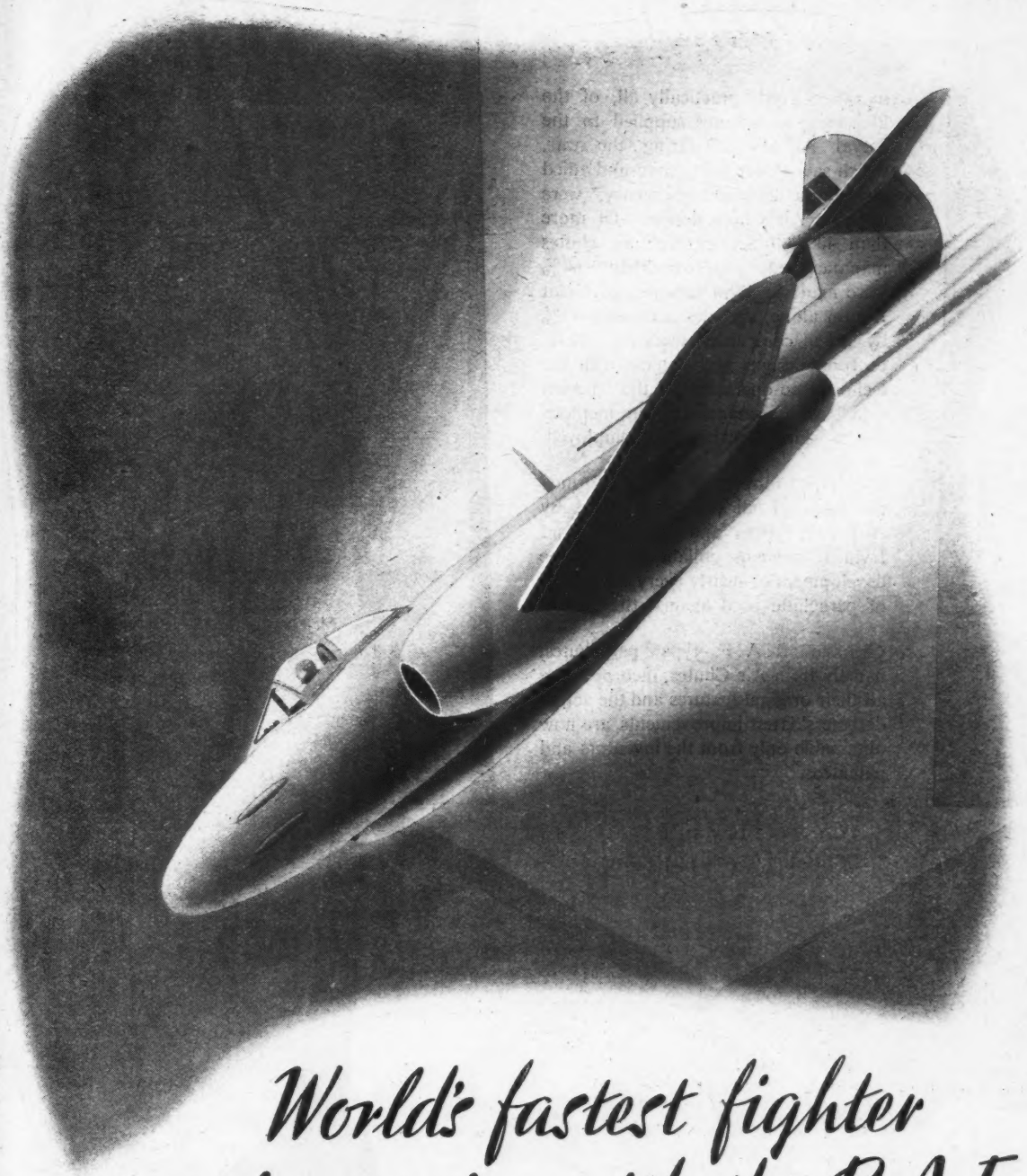
OBSOLETE AIRCRAFT

OF 59 Sunderlands in West Africa at the end of the war, 23 of the oldest were scuttled after useful equipment had been taken out of them. This fact was disclosed in the House of Commons on March 6th by the Under-Secretary of State for Air when answering a question about the scrapping of aircraft. He warned the House that numbers of obsolescent combat aircraft might have to be scrapped if an intolerable waste of manpower for their maintenance was to be avoided.

Two weeks later, in reply to a question regarding obsolete operational aircraft, the Under-Secretary announced that all marks of the following aircraft have now been declared obsolete by the Air Ministry:

British Aircraft.—Albemarle, Battle, Blenheim, Botha, Defiant, Gladiator, Hampden, Lerwick, London, Lysander, Manchester, Stranraer, Wildebeeste, Whirlwind, Whitley.

American Aircraft.—Havoc, Hudson, Kittykawk, Maryland, Tomahawk.



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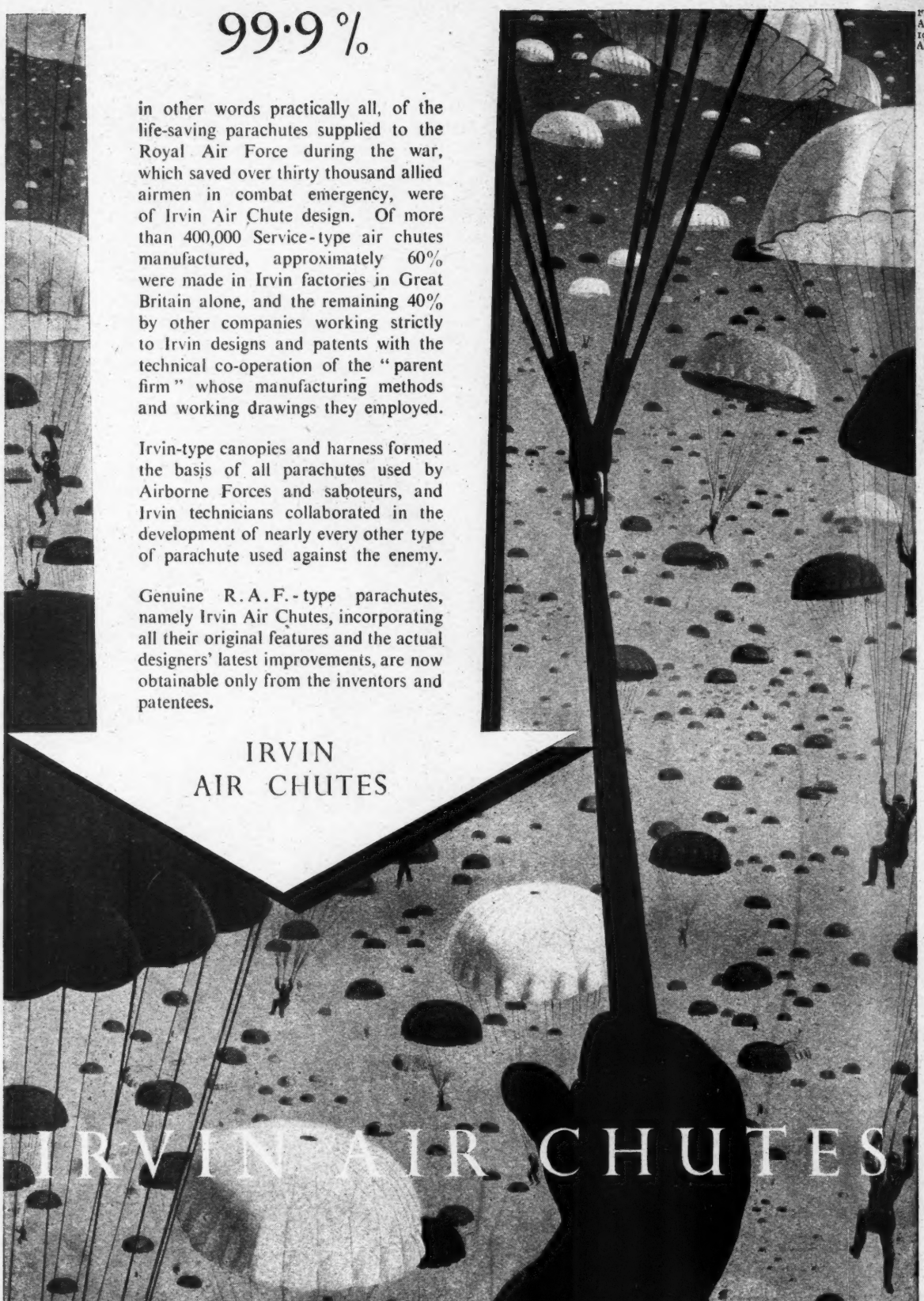
in other words practically all, of the life-saving parachutes supplied to the Royal Air Force during the war, which saved over thirty thousand allied airmen in combat emergency, were of Irvin Air Chute design. Of more than 400,000 Service-type air chutes manufactured, approximately 60% were made in Irvin factories in Great Britain alone, and the remaining 40% by other companies working strictly to Irvin designs and patents with the technical co-operation of the "parent firm" whose manufacturing methods and working drawings they employed.

Irvin-type canopies and harness formed the basis of all parachutes used by Airborne Forces and saboteurs, and Irvin technicians collaborated in the development of nearly every other type of parachute used against the enemy.

Genuine R.A.F.-type parachutes, namely Irvin Air Chutes, incorporating all their original features and the actual designers' latest improvements, are now obtainable only from the inventors and patentees.

IRVIN
AIR CHUTES



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Air Estimates

Figures for Aircraft, Engines, Equipment and Civil Aviation Not Included

Mr. John Strachey, Under-Secretary of State for Air.

The Rt. Hon. Viscount Stansgate, D.S.O., D.F.C. Secretary of State for Air.

THE details of the Air Estimates for 1946 were issued on April 2nd. In a general way the method of presentation reverts to that of pre-war years, but certain differences make it more difficult to form a complete picture. Most important of these differences are the statements made in the Commons and Lords on March 12th, which took the place of the Memorandum by the Secretary of State for Air which used to be issued with the Air Estimates, and the disappearance of the Votes for Technical and Warlike Stores, Supplies and Equipment, in which were formerly set out the sums to be expended during the year on aircraft, engines and equipment. In the 1946 Air Estimates it is stated that "Provision for aircraft and other technical supplies and services (including research and development) required for the Royal Air Force is made in the Vote for the Ministry of Supply (Civil Estimates, Class X, Vote I)." But since the Civil Estimates have not been issued yet there is no way of knowing how much it is proposed to spend on aircraft and power plants.

A summary of the statement made in the House of Commons on March 12th by the Under-Secretary of State for Air, Mr. Strachey, was published in our issue of March 21st. In that statement Mr. Strachey explained and elaborated on some of the figures which now appear in the Estimates. Our readers will, therefore, have to refer back to that issue for information concerning which but a bare mention can be made here.

The net expenditure was given by Mr. Strachey as £255,500,000. The Estimates disclose that the gross figure is £276,826,000, but that this is reduced to the figure given by appropriations-in-aid, which amount to £21,326,600. The maximum number of officers and airmen to be maintained, excluding those serving in India on the Indian establishment, is 760,000. This figure does not include personnel of the Auxiliary and Reserve forces, the number of which is given separately under Vote 7 as 72,000.

Detailed Estimates

In his statement Mr. Strachey gave the totals of expenditure under the different Votes, and we published them on March 21st. Following are the detailed estimates:

Vote 1 (Pay, etc., of the Air Force): Pay, etc., of officers, £31,000,000; pay, etc., of airmen, £97,000,000; pay, etc., of the W.A.A.F., £6,330,000; pay, etc., of local forces abroad, £260,000; contributions under national insurance schemes, £1,740,000; salaries, wages, etc., of civilians, £15,500,000; salaries, wages, etc., of the Royal Observer Corps, £160,000; war gratuities, £25,500,000; post-war credits, £11,500,000; prisoners of war £10,000.

Vote 2 (Quartering, non-technical supplies and transportation): Billeting and miscellaneous accommodation expenses, £280,000; barrack services, £1,676,000; fuel and light, £2,412,000; general stores, £1,109,000; clothing, £880,000; provisions and animals, £4,115,000; transportation, £12,894,000.

Vote 3 (Technical supplies and services): Petrol, oil and lubricants, £17,000,000; miscellaneous technical supplies and services, £3,500,000.

Vote 4 (Works, buildings and lands): Salaries, etc., of staff for works services, £2,700,000; new works, additions and alterations over £10,000 each, £7,800,000; new works, additions and alterations under £10,000 each, £600,000; ordinary repairs, renewals and maintenance, £13,200,000; grants towards the cost of works, £20,000; purchases of lands and buildings, £1,500,000; rents and reinstatements, £4,500,000; surveys and miscellaneous services, £100,000; stores and plant purchased for issue to, or use on, works services, £1,250,000.

Vote 5 (Medical services): Pay, etc., of the nursing service, £224,000; fees, etc., of civilian practitioners, £60,000; salaries wages, etc., of civilians, £15,600; medical stores and supplies, £98,000; payments to hospitals, £35,000; miscellaneous charges, £1,400.

Vote 6 (Educational services): Salaries, fees, etc., of educational staff, £558,000; miscellaneous charges, £209,000.

Vote 7 (Reserve and Auxiliary Forces): Royal Air Force Reserve and Volunteer Reserve, £100,000; Auxiliary Air Force, £60,000; Air Training Corps, £185,000; miscellaneous services, £5,100.

Vote 8 (Civil Aviation) not included in the Air Estimates.

Vote 9 (Meteorological and miscellaneous effective services): Salaries, wages, etc., of staff of the Meteorological Office Headquarters, £255,000; salaries, wages, etc., of staff at meteorological stations, £622,000; meteorological equipment and research, £293,000; miscellaneous meteorological charges, £12,000; compensation for losses, etc., £455,000; telecommunication services, £750,000; allowances to ministers of religion, £55,000; payments for flying training, £1,400,000; losses by exchange, payments of commission, etc., £20,000; miscellaneous charges, £457,500.

Air Ministry and Pensions

Vote 10 (Air Ministry): Salaries, wages, etc., £3,242,000.

Vote 11 (Half-pay, pensions and other non-effective services): Rewards to officers and airmen, £73,000; half-pay of officers, £10,000; retired pay and gratuities of officers and nurses, £2,240,000; pensions and gratuities to officers for wounds, £500; pensions and gratuities to airmen, £440,000; pensions, gratuities and allowances to families of deceased officers and airmen, £56,000; civil non-effective payments—recurrent charges, £87,000; civil non-effective payments—gratuities and other non-recurrent charges, £98,000; injury grants, £72,000; commutation of retired pay, pensions, etc., £44,000; relief fund, £500; miscellaneous non-effective payments, £7,000.

As in pre-war years, each Vote is accompanied by explanatory notes, extracts and summaries of which follow.

Vote 1 provides for the pay of officers and airmen of the R.A.F., officers and airwomen of the W.A.A.F., mobilized officers and airwomen of the R.A.F.R. and R.A.F.V.R., embodied officers and airmen of the A.A.F., officers and airmen of the Polish Air Force serving with the R.A.F., and native officers and other ranks of local forces serving with the R.A.F. abroad.

Vote 2 provides for billeting and accommodation expenses, barrack services, supply of water and light, fuel, general stores, clothing, rations and animals. The provision covers cost of supplies and services for the reserve and auxiliary forces as well as for the regular air force.

Reference has already been made above to Vote 3. In the 1946 Air Estimates the Vote covers the cost of petrol, oil and lubricants, and those technical supplies

AIR ESTIMATES

(paints, dopes and ground-handling equipment) and services (hiring of moorings) which are produced directly by the Air Ministry. It provides also for supplies and services purchased locally by the R.A.F.

Vote 4 provides for the construction and upkeep of R.A.F. buildings and airfields, supply of fixed machinery and plant, purchases and rents of lands and buildings, upkeep of estates, the operation of electrical, heating, water and drainage plants, and for works staffs employed outside the Air Ministry.

Vote 5 does not appear to require explanation, the subheads of the various items being in the main self-explanatory. The same applies to Vote 6.

Vote 7, Reserve and Auxiliary Forces, appears to require rather more explanation, and we therefore quote extensively from the notes in the Air Estimates. The Vote provides for the emoluments of Reserve and Auxiliary Air Force personnel in respect of training; grants to Territorial Army and Air Force Associations to cover the administration expenses of the Auxiliary Air Force; grants to school and local units of the Air Training Corps and certain other expenses connected with the Corps; and local expenses of University Air Squadrons.

Reserve and Auxiliary Forces

Of the R.A.F.R. and R.A.F.V.R. the explanatory notes say: Planning is proceeding on the basis that they will be resumed after the present emergency. The organization and training of these reserves, and the emoluments of personnel, have not yet been settled. Provision is made for payments at the rates existing before the war.

Planning is proceeding on the basis of the resuscitation of the Auxiliary Air Force flying squadrons in existence before the war under the administration of Territorial Army and Air Force Associations, who would receive grants to provide for the expenses of administering the units when not called out for training or air force service. Each squadron would be located on an airfield within or adjoining the locality from which the personnel would be recruited; where necessary, town headquarters would be provided. Squadrons would be commanded by Auxiliary Air Force officers with a staff of regular air force personnel and civilians to form a nucleus of the administrative and maintenance staffs of the units and to act as instructors of Auxiliary Air Force personnel. Emoluments not settled. Payment at pre-war rates.

The Air Training Corps, it is explained, provides pre-entry training for young men between the ages of 15½ and 18 years who intend to serve in the regular, reserve or auxiliary air forces. The corps is organized in school and local units, which receive grants for expenses of administration at capitation rates based on the number of efficient and proficient cadets. Where necessary, units are provided with accommodation for use as headquarters; where possible, adapted R.A.F. hutting is used.

Gliding schools have been established to provide elementary gliding training for potential aircrew cadets. In 1946, gliders will be provided for on the Vote for the Ministry of Supply; other equipment (winches, retrieving cars) will be supplied from R.A.F. stocks. The expenses provided for under Vote 7 are those for minor repairs and servicing of equipment, petrol and oil (for winches and retrieving cars), administration and sundry services which, within a specified limit for each class of expenditure, may be incurred locally.

Air Training Corps officers are commissioned in the Training Branch of R.A.F.V.R. and ordinarily receive no payment. When undergoing courses of instruction they receive the pay of their substantive rank and are provided with accommodation and rations in kind, or cash allowance in lieu. Similarly, A.T.C. warrant officers receive pay during courses of instruction, and are provided with free accommodation and rations.

Subject to certain conditions, A.T.C. officers on appointment receive an allowance of £20 for provision of uniform.

The University Air Squadrons, which are in existence at 17 universities, have as their objects the promotion of the flow of candidates for commissions in the regular, reserve or auxiliary air forces, the stimulation of interest in air matters and the maintenance of liaison with the universities on technical research problems affecting aviation. The syllabus of training is broadly the same as at R.A.F. initial training wings, with the addition of a limited amount of flying training.

The provision covers the expenditure which the chief instructor of a university air squadron may incur in respect of certain miscellaneous administrative services. The maximum sum allowed to any one squadron is £250 a year.

Votes 9, 10 and 11 are fairly self-explanatory from the nature of their subheads

R.A.F. RESERVE COMMAND

RESERVE Command of the Royal Air Force is to be re-established in the immediate future. This information was given by Mr. Strachey, the Under-Secretary of State for Air, in the House of Commons on Wednesday, March 27th.

The function of Reserve Command will be to maintain and train adequate reserves of both flying and ground personnel. It will, therefore, be responsible for recruiting to the R.A.F. Volunteer Reserve, for developing the Auxiliary Air Force and, in co-operation with the university authorities, the university air squadrons, and it will also take over responsibility for the Air Training Corps. It is to have group headquarters which will coincide geographically with Army Commands, and these headquarters will set up centres in towns and provide training facilities. As soon as this is done, officers and men released from the R.A.F. will be invited to join the reserve forces. The Territorial Army and the Air Force Association will become the main recruiting agency.

The Auxiliary Air Force will be composed of twenty squadrons—namely, those which existed before the war, which will be re-created on their former territorial basis. When fully trained, these units will mostly be day and night fighter squadrons, and will form part of the country's first-line air defence. However, there will also be several light bomber auxiliary squadrons and some non-flying auxiliary units in such spheres as radar and operational control. Discussions are taking place with university authorities to determine which universities will be able to maintain air squadrons.

A.T.C. is to be maintained at a strength of 75,000 for the time being, and it should be possible to accept into the regular Air Force from a Corps of this size all cadets of a satisfactory standard. It is emphasized, however, that not all can become aircrew. The A.T.C. will be kept informed of the proportion of cadets who can become aircrew, or, alternatively, can be absorbed into various trade groups, so that A.T.C. squadrons will be able to plan their initial training on the most economical basis.

Mr. Strachey said that the utmost importance was attached to the non-regular forces and that it might well be possible, and even desirable in future, to develop them to a much greater degree than formerly. Such developments, however, would take time, and it would not be possible immediately to offer the same facilities as existed before the war for intending recruits to non-regular forces.

FORTHCOMING EVENTS

April 10th.—R.Ae.S. Leicester Branch; "Postwar Transport Aircraft Design," by Mr. F. Radcliffe (Leicester Tech. College).

April 16th.—**R.Ae.S. Graduates and Students' Section; "Flight Refuelling," by Sir Alan J. Cobham.

April 25th.—R.Ae.S., Manchester Branch. (Whittle Lecture).

April 25th.—*R.Ae.S., "Modern Aeronautical Materials," by Dr. L. Aitcheson.

April 26th.—Institute of Transport. Lunch and address by Lord Winster. Connaught Rooms. 12.45 p.m.

April 27th.—S.L.A.E. Helicopter Lecture and Film: Manson House, Portland Place, W.1. Speaker: Mr. Raoul Hafner. 3.30 p.m.

* Lecture Hall, Institute of Civil Engineers, Gt. George St., S.W.1.

** The Library, 4 Hamilton Place, W.1.

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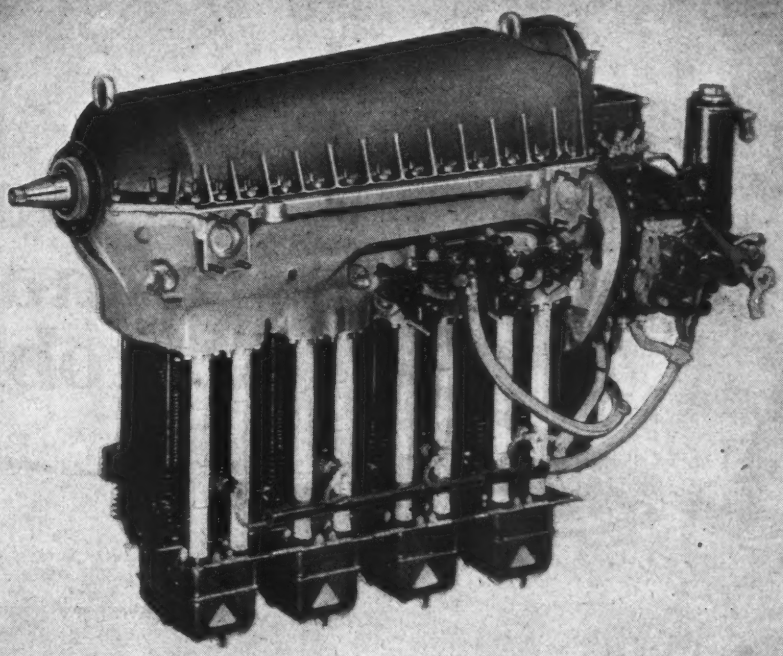

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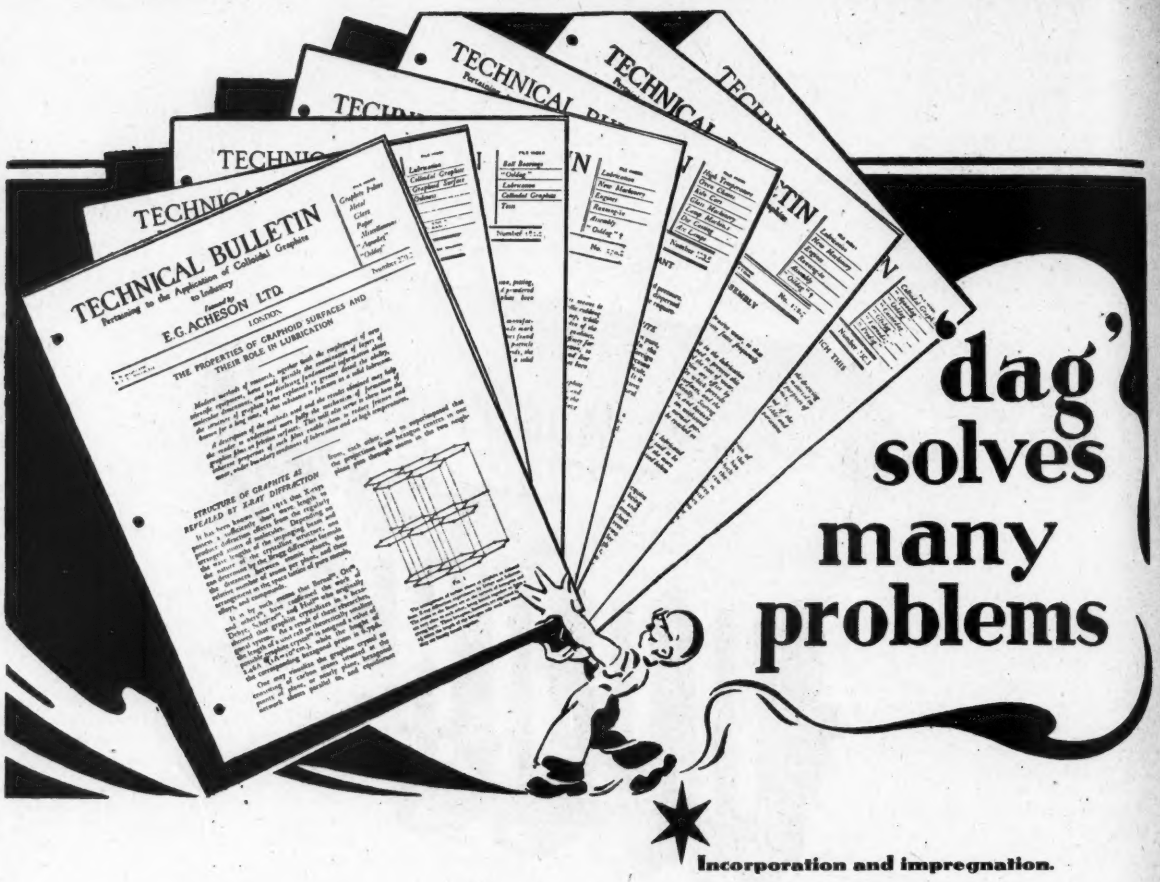
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HERE and THERE

Accident-free Month

DURING the month of March, R.A.F. Transport Command, without accident, flew 5,667 Service men home from India and took 4,308 out to India from Britain.

More than 16,000 Service personnel have been brought safely home by the Command during the past three months, and 14,000 have been taken to the Far East. Since large-scale air trooping began last October, the total is 37,000 brought home and 43,000 taken out.

Golfer's Special

ACCORDING to a *Reuter* message from New York, Mr. Fred Corcoran, manager of the U.S. Professional Golfers' Association, has said he understands that a "large international airline company" intended to fly a "golfers' special" to England for the British Championships.

Both Byron Nelson and Ben Hogan, he added, were making plans to compete in the British Open Championship event in July next.

In "South-Ken" Museum

THE National Aeronautical Collection at the Science Museum, South Kensington, was reopened to the public on March 30th. The main gallery housing this collection suffered most during the bombing in September, 1940, and some immovable exhibits and a number of special show cases were damaged. The former have now been restored and—with the exception of Henson's model of 1842 and the Lilienthal glider of 1895—all the historic flying machines are again on view.

New additions include the original Whittle jet engine W.1, and an example of the German V.1 "flying-bomb," sectioned and illuminated to show the technical features.

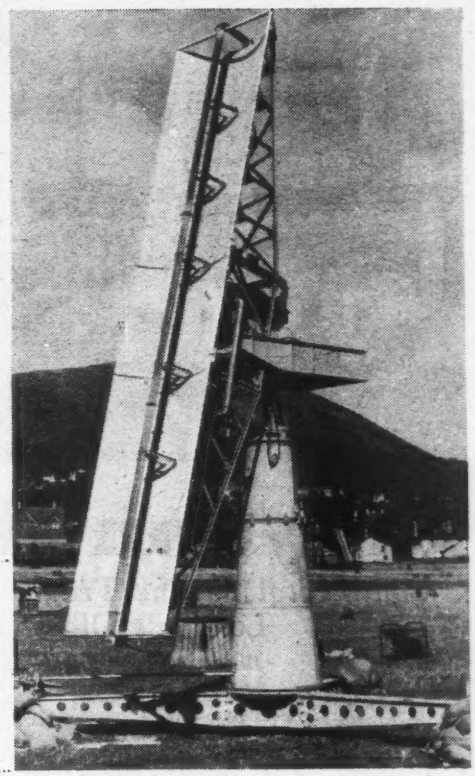
The remarkable development of military aircraft during the war period is illustrated by scale models of outstanding fighter and bomber types. A "Merlin" III engine used in the Battle of Britain and examples of the later jet engines are also on show.

Scope for Amateur "Wops"

ORGANIZATION of an Air Force Amateur Radio System to act as a practical radio auxiliary of the permanent R.C.A.F. is being planned by the Hon. Colin Gibson, the Canadian Air Minister, and Air Comdre A. H. Keith Russell, formerly C.O. at No. 4 Wireless School, Guelph, has undertaken the task of organizing the civilian side of the system.

The organization will consist of groups of amateurs affiliated to R.C.A.F. auxiliary squadrons and in radio contact with squadron signals personnel. Those holding operating and station licences will be loaned transmitting and receiving equipment from surplus R.C.A.F. stocks, and both Morse and R/T will be used. Messages will be relayed across Canada to demonstrate the rapidity of the system.

The scheme also takes in unqualified enthusiasts who want to work for their amateur radio licences. These will be given provisional membership and the auxiliary squadrons will provide instruction and encouragement.



PORTABLE: This radar aerial, mentioned during the recent Radar Convention held at the Institution of Electrical Engineers in London, was designed for transport by air. It is readily dismantled into suitably small components.

News in Brief

According to the Los Angeles press, there are now 14 "jet projects" scheduled in California, of which only three, the P-80, P-81, and FR-1, have so far been publicly announced.

* * *

Among the new bombers reported to be coming along are two Northrop flying wings, the XB-35 and XB-45, and a twin-jet version of the XB-42 Mixmaster.

* * *

New U.S. fighters include a Northrop flying wing, XP-79, in which the pilot lies prone (minimum "G" effect), and successors to the Ryan Fireball and the Shooting Star.

* * *

There were three accidents involving death or injury during the 35,000,000 passenger-miles flown during February on scheduled services, special flights, and trooping movements carried out by Transport Command and other Commands of the R.A.F. These resulted in eight crew and two passengers killed, and four crew and nine passengers injured.

As from April 1st, the Ministry of Aircraft Production was merged into the Ministry of Supply, under Mr. John Wilmot, and will have two Parliamentary Secretaries—Mr. W. Leonard and Mr. A. Woodburn. The latter was formerly Parliamentary Secretary to M.A.P.

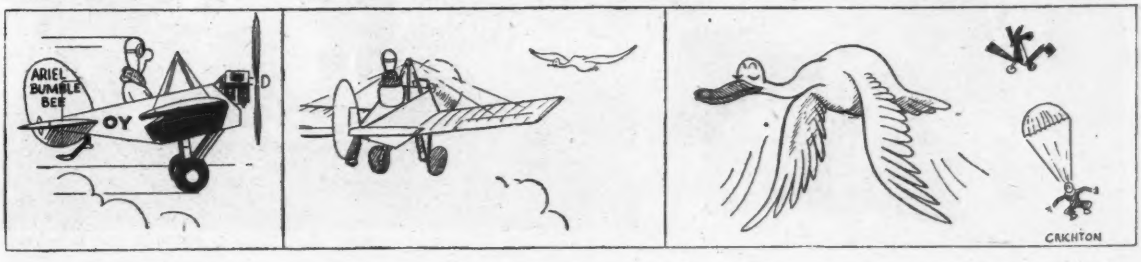
* * *

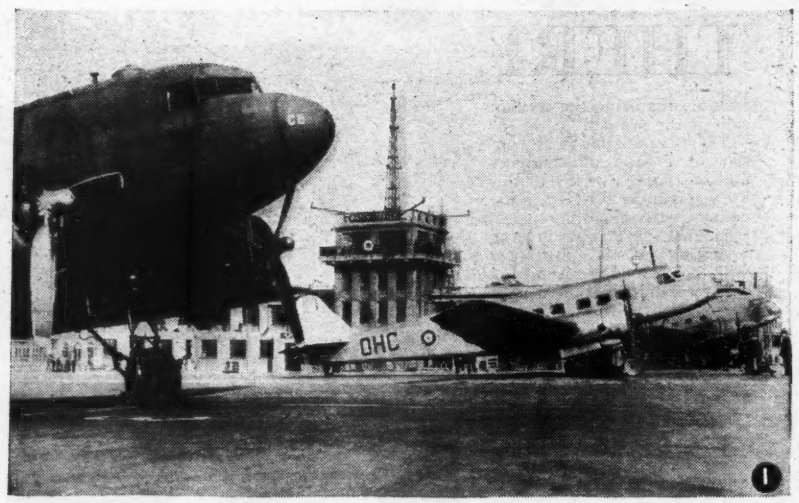
Operational control of Bovington air base, built by the U.S.A.A.F., reverts to the British Air Ministry on Monday next, April 15th. It was at first an experimental station for the U.S. 8th Air Force and later became one of the biggest U.S. Transport Command stations this side of the Atlantic.

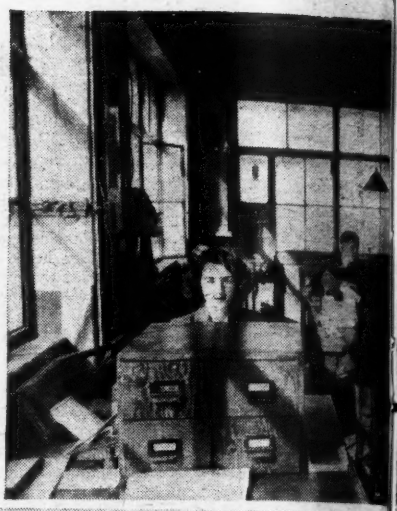
* * *

"The Jet-Propelled Shell" is the title of a new documentary film produced by the Soviet Popular Scientific Films Institute. The film reviews the development of rocket projectiles from what are described as "jet-propelled arrows" used by the Chinese in the 13th century, to the multi-barrelled "Katusha" rocket gun of the recent war.

AIRSTRIP . . . . . No. 9



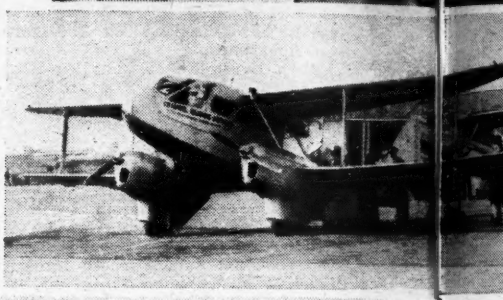




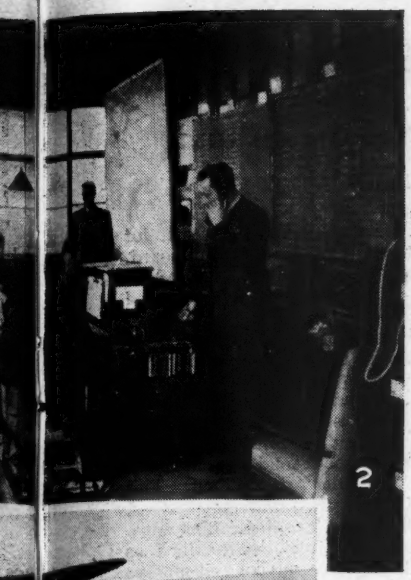
Croydon Airport

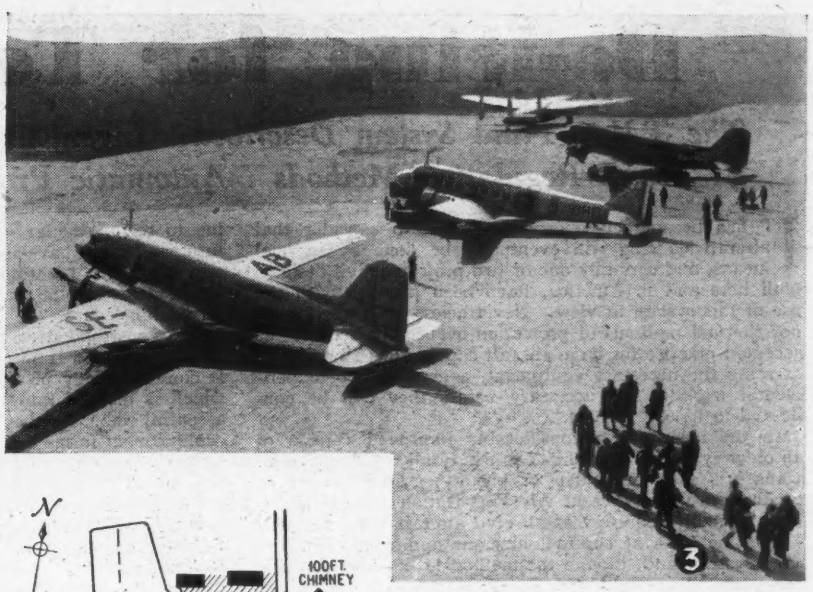
Continental Airline Traffic Continues to Use London's Oldest Airport

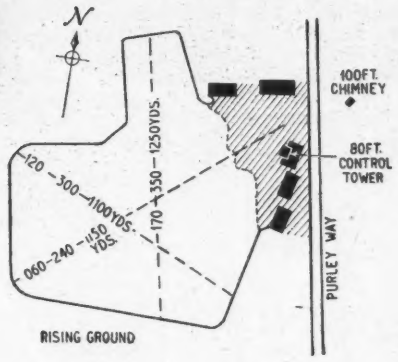
(Illustrated by "Flight" photographs)



5. Passengers disembark from a Railway Air Services Avro XIX.
6. Offloading luggage from the nose of the Avro XiX.
7. Luggage is loaded up into the K.L.M. Dakota.







1. Two Dakotas and a Bloch 221 lined up on the tarmac outside the airport building.

2. Flying Control is still manned by R.A.F. personnel. The Deputy Air Traffic Controller is seen in charge.

3. Swedish A.B.A. Dakota, Air France Bloch and K.L.M. Dakota, and a B.O.A.C. York about to taxi on a test flight.

4. Internal airline and charter operators. Rapides belonging to Channel Islands Airways and Air Taxis, Ltd., with a Morton Air Services Auster in the background.

8. Passengers who have been cleared by Customs, depart by coach for London.

THERE has for many years been justifiable doubt about Croydon's continued usefulness as an airport. Nevertheless, it operated consistently as the main airport for London until the outbreak of war, and, since hostilities ceased, it has again become an important air terminal for London. Further, until such a time as the services at present operating there can be absorbed by some other London airport, there is little doubt that Croydon will continue to fulfil an extremely useful function. However, the type of traffic which can use it must always be limited by the facts that the maximum runway length is only 1,250 yards, and that the airfield is as badly located, according to modern standards, as it could be.

In spite of these difficulties, the volume of traffic handled at Croydon is very considerable. Transport Command still run services all over the Continent from the airport. In addition, the following Continental airline companies, internal airlines and charter companies are using the airport daily:—

Continental Operators: K.L.M., Air France, Swedish A.B.A., Swissair and S.A.B.E.N.A.

Internal Airlines and Charter Services: Aer Lingus, Railway Air Services, West Coast Air Services, Channel Islands Airways, Morton Air Services, Air Taxis, Ltd., British American Air Services.

Some idea of the present intensity of the traffic can be gauged from the fact that, during March, when weather and airfield unserviceability were so bad as to make airline operation at Croydon almost impossible for a week, the aircraft movements undertaken by these operators totalled 1,119, and they handled 8,151 passengers and 216,769lb of freight. In addition, there were a total of 377 movements of Transport Command aircraft.

The general administration of the airport is the responsibility of the Ministry of Civil Aviation, but traffic handling arrangements for most of the airline companies is undertaken by B.O.A.C. Certain specialist facilities such as flying control and telecommunications are still the responsibility of the R.A.F.

C. S. W.

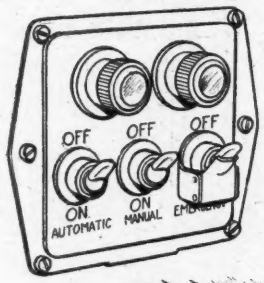
De-icing for To-day

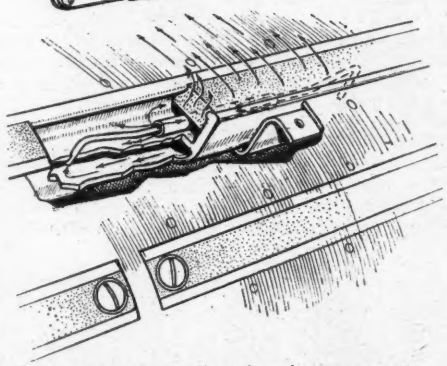
The T.K.S. Fluid System Described : Ingenious Distribution and Regulation Methods : Automatic Protection

IT has become customary nowadays to consider that aircraft de-icing will eventually be done by thermal means, and certainly one or two projected civil designs, both here and in America, have been planned with the use of this system in view. Nevertheless, and whether or not thermal methods of protection eventually become the accepted practice for large aircraft capable of economically carrying the necessary equipment, a good deal of experimental work is still necessary before they can be considered to have "arrived."

In the meantime a considerably improved version of an older system is being fitted to nearly all the British civil transports now in course of prototype development or production. The present Air Registration Board regulations virtually require that all civil aircraft must be fitted with some form of aerofoil, airscrew and windscreen de-icing system, and, though the method to be used has been left to the discretion of the manufacturers, the latter are naturally going ahead with the installation of equipment which is now available and which has the capacity to do the job.

This equipment, the T.K.S. (of which the letters are made of the names Tecalemit, Kilfrost and Sheepbridge Stokes, thus indicating something of the origin of the components), can, as a matter of history, be fairly considered to be the direct heir to the Dunlop system, which was originally developed and tested by Farnborough. In it a special de-icing and anti-icing fluid was fed to porous overshoes in the leading edges.





The T.K.S. distributors and control panel in their latest form. The porous "spreader" is flush with the leading edge.

Endurances

The same principle is used today in the T.K.S. system, though the methods of distribution and regulation have been very much improved, and the fluid itself has been modified in its constituency to permit greater economy and endurance in operation. So much so that the equipment in an aircraft of the Tudor size has an endurance, at the normal rate of feed, of something like five hours or, with heavy icing emergency delivery, of more than an hour. Since the object of all meteorological reports and of all-weather flying is that of avoiding icing conditions as far as possible, such endurances should be more than ample. Incidentally, the total weight of the equipment carried is less than half that of the fluid, so it is obvious that, for shorter-stage journeys, the total figure concerned may be reduced accordingly. In the case of the Viking installation, for instance, the equipment itself weighs 145lb, while the fluid, when a maximum supply is carried, weighs 160lb.

Two major problems have had to be overcome in the course of development of the T.K.S. system. The first being that of regulating the flow at the surfaces so that the fluid will quickly reach all essential points and yet not be wasted, and the second that of initial regulation for different conditions.

The regulation and accurate dissipation at the surfaces is completed by special distributors which are built into the leading-edge structures in positions and in numbers according to the particular requirements. A large aircraft, for instance, might have triple lengths of distributor inboard, two at the mid-section, and one near the tip; while a single strip only might be required for the tailplane and fin leading edges.

The construction and operation of the distributor may best be followed from a study of the sketch on this page. It consists briefly of a radiused square-section metal tube which is divided into two longitudinal compartments by a central web. As the distributor is installed the rearmost compartment forms the primary feed. From this the fluid is led by capillary control tubes to the second compartment, into which a porous metal "spreader" is sintered. This porous distributor becomes, after the sintering process, actually part of the tube and forms part of the leading edge. The de-icing fluid—which may roughly be described as being a compound of alcohol, glycerine, glycol and glucose—seeps through the spreader evenly and runs over the surface at a known and controlled rate.

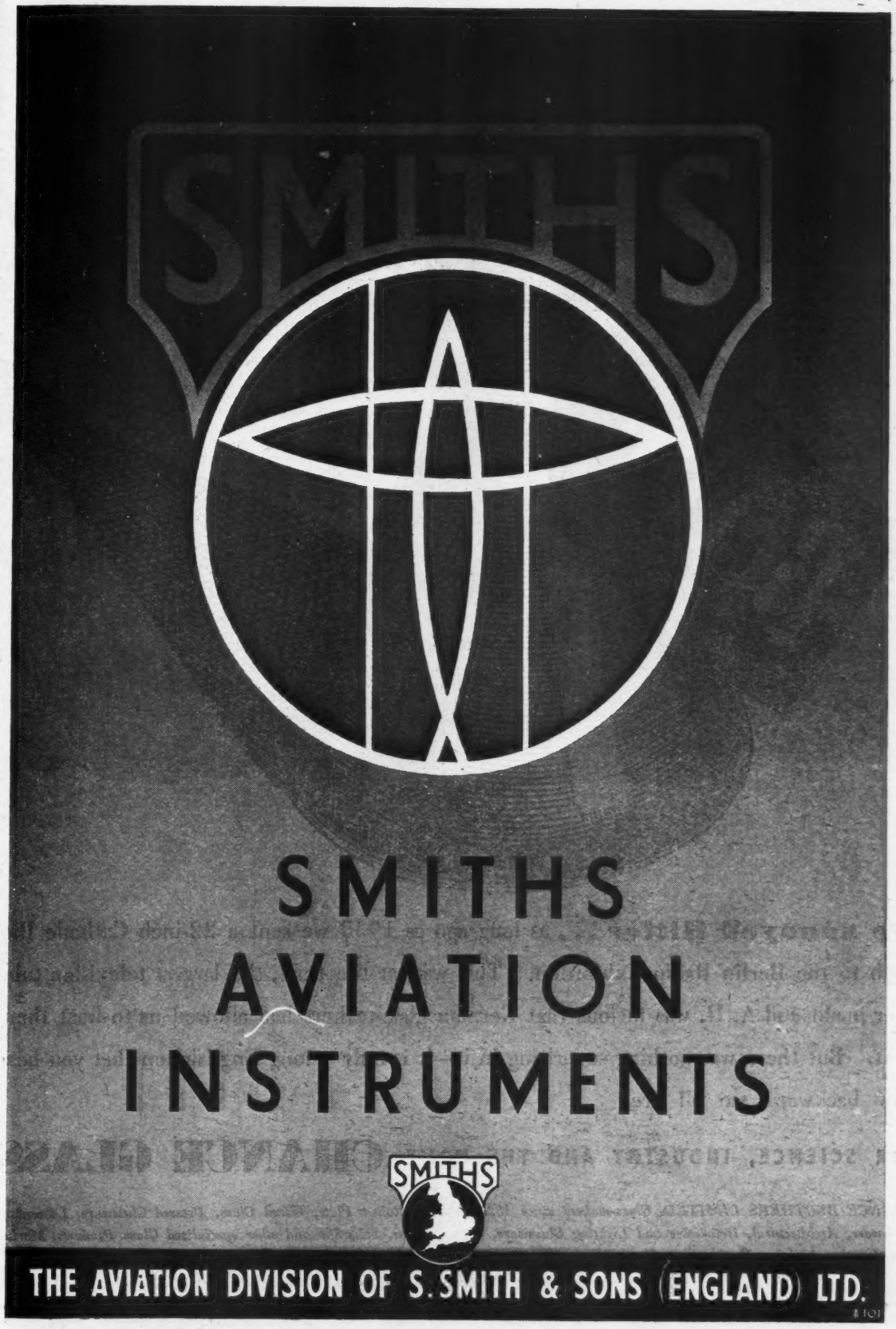
The relative viscosity of the fluid is of considerable importance and has been the subject of much development. In earlier attempts to obtain an even film of fluid on the wing surface, low-viscosity liquids were used because these were more easily distributed. Though adequate for the purpose, these earlier fluids were extravagant because the protective film could only be maintained by using high rates of flow; development of the present distributor enables a more viscous (and economical) fluid to be used.

Automatic Control

The pressure feed is maintained by means of an electrically-driven Tecalemit micro-pump, which is controlled automatically and is mounted directly below the fluid supply tank. In the latest version of the T.K.S., the electrical flow controller has been separated from the control panel itself and can be installed in any position in the aircraft, while the panel, which is now only a matter of four or five inches square, can be situated in the most convenient dashboard or other mounting, where it can be in continuous view.

There are three different "standards" of de-icing control, and these can be selected by three switches on the panel. The first can be described as being directly manual, since the supply is switched on or off at the will of the pilot, though there is a degree of automaticity since the initial supply of fluid is regulated to provide an ample and quickly-formed film.

The second "standard" is automatic. In this case the switch concerned is left on during flight, and a Smith automatic ice-detector brings the pump into action when icing conditions are met. This detector briefly consists of a small tube, mounted in the direct airflow, with the number of microscopic holes; at the first sign of ice formation, and long before any deposits appear on the aircraft structure, these holes are plugged by the formation and pressure-change causes an electric contact to be made. The de-icing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THE AVIATION DIVISION OF S. SMITH & SONS (ENGLAND) LTD.

We annoyed Hitler... as long ago as 1938 we sent a 22-inch Cathode Ray Bulb to the Berlin Radio Exhibition. This was, at the time, the largest television tube ever made and A. H. was furious that German glass-makers had allowed us to beat them to it. But there was nothing surprising in it—it is only among Englishmen that you hear how backward we all are.

FOR SCIENCE, INDUSTRY AND THE HOME CHANCE GLASS

CHANCE BROTHERS LIMITED, Glass-makers since 1824, produce Rolled Plate, Wired Glass, Pressed Glassware, Laboratory Glassware, Architectural, Decorative and Lighting Glassware, Optical Glass, Scientific and other specialised Glass Products, Marine and Aviation Lighting Equipment. Head Office: SMETHWICK, BIRMINGHAM; London Office: 10, PRINCES STREET, WESTMINSTER, S.W.1. Scottish Works: FIRHILL, GLASGOW, N.W.

DE-ICING FOR TO-DAY

system then goes automatically into action, and the fact is notified to the crew by the lighting of a small green lamp on the panel.

The third "standard" is for emergency use, and provides something like five times the normal rate of flow so as to deal adequately with any extreme conditions which may be met. In this case a red light glows as a reminder to the crew that this maximum flow is being used.

So that no pulsation effects reach the distributors the rhythms of the pump deliveries must obviously be checked. In earlier installations the pulsations were damped out by means of a small rubber ball-valve in each delivery pipe, but the latest system makes use of the natural flexibility of rubber tubing, and the first few inches of pipeline from the pump are of rubber. Incidentally, it is interesting to know the pressures obtained at different temperatures and fluid viscosities. At +15 deg C, for instance, the delivery is at 4.65 lb/sq in; at zero it is 8 lb/sq in; and at −40 deg C it is 115 lb/sq in. Normally, icing conditions are only met between −10 and + 10 deg C.

Since no pump can be expected to provide very wide variations in delivery rate, the normal flow is regulated by introducing controlled periods of "on" and "off" in a time-cycle of 1 and 4 respectively except when the system is first switched on. The heavy emergency flow is produced by cutting out the "off" periods in the cycle and thus providing a continuous supply. The same fluid supply and pump is used to feed the airscrew slinger rings from which fluid is centrifugally directed to protect the leading edges of the blades.

CIVIL AVIATION NEWS

VIKINGS FOR I.N.A.

SIX Vickers Vikings have recently been ordered, through Airwork, the company's U.K. representatives, by Indian National Airways. The type being supplied to I.N.A. is the 24-passenger version with an operational crew of three and an air hostess.

NEW AIRCRAFT MODIFICATIONS

ANY doubts as to who is responsible for ordering and for carrying out modifications to new civil aircraft were dispelled on March 21st when Mr. Woodburn, the Parliamentary Secretary to the Ministry of Supply, in a reply in the House of Commons, said that it had been decided that all aircraft required by the public corporations operating civil air services should be ordered through the Ministry of Supply. He also explained that modifications to such aircraft prior to delivery are discussed by all concerned under arrangements made by the Ministry.

NEWCASTLE TO THE CONTINENT?

AN airport in North-East England suitable for direct flights to the Continent is envisaged by the Ministry of Civil Aviation. Mr. Ivor Thomas confirmed this when he met a deputation of Northern Labour M.P.s and representatives of the North-Eastern Airport Joint Committee recently. He added that a survey of the entire Tees and Tyne area had been carried out, and it showed that the extension of existing airfields was likely to sterilize large quantities of coal. The investigation was being continued, but, meantime, the two available alternatives were Woolsington, which was too small for Continental traffic and could, therefore, only be used for internal services, and Croft, which, although it could be used for direct flights to the Continent, was further away from Newcastle. In fact, it is only a few miles from Darlington.

B.O.A.C. MOVE

ALTHOUGH B.O.A.C. flying boat services are continuing to operate from Poole Harbour, the buildings which were formerly occupied there by the Corporation as a headquarters have had to be given up, as they are now due for return to their rightful owners, a tile company. For the time being, therefore, the B.O.A.C. headquarters has been moved from Poole to Hythe, and the passenger handling will be directed from a yacht club in Poole Harbour. B.O.A.C. are understood to be discussing with the Ministry of Civil Aviation, the Southern Railway and the Southampton Harbour Board, the eventual location of their flying-boat handling facilities.

SURPLUS AIRCRAFT ALLOCATION

SUCCESSFUL tenderers for surplus aircraft include sixteen air operators who have signified their intention of using the machines wholly or partly for charter work. This information was given on March 25th by the Minister of Supply in the House of Commons in reply to a question by Air Commodore Harvey. He also said that at least seven of the operators could be identified as having operated before the outbreak of war. They were:—

Air Taxis Ltd., Allied Airways (Gandar-Dower) Ltd., Herts and Essex Aviation Ltd., Hunting Aviation Ltd., Southern Aircraft (Gatwick) Ltd, Straight Corporation Ltd. and W. A. Rollason.

CAN GIANTS BE USED?—AN AMERICAN OPINION

SOME outspoken and even, from many points of view, almost reactionary views were expressed recently by the export vice-president of the Douglas Aircraft Company when chatting recently to one of our representatives who is at present touring the States. Major General Victor Bertrandias suggested that until scientific and mechanical means had been found to make real all-weather flying an accomplished fact, the medium-sized civil transport aircraft would still remain the best airline-operating proposition.

In spite of the fact that his company has recently flown and fully publicised their Globemaster, the Army transport version of the D.C.7 he thought that the 30-40 passenger aircraft was still a very much better all-round proposition. Bigger aircraft were not suited to any but the very best and largest airfields, and it was, he said, better to tie up one's money in smaller units—particularly as the handling of passengers at the rate of a hundred a time might prove to be quite a difficulty. While an aircraft such as the D.C.6 might cost something like £150,000 and take perhaps a year to develop, the very large aircraft might cost as much as £500,000 in development and other costs and would take twice as long to produce.

Major General Bertrandias said that

BIRD OF PEACE: Technicians busy on the second prototype of the de Havilland Dove. The plastic dome on the cockpit covering houses the D.F. aerial.

CIVIL AVIATION NEWS

the next Douglas type would be a fast 25-35-passenger type for the shorter routes, and although much of his comment was clearly given from the Douglas point of view, there seems now to be a slight lessening of enthusiasm in the American aircraft industry generally over the production of giants. The big aircraft now on the stocks have, after all, been sponsored and paid for by the Army and Navy, and were not specifically developed with an eye to civil use. This is a fact not often known or considered by the public, who naturally imagine that the Constitution and Convair 37, for instance, were civil developments from the start.

ANOTHER U.S. LIGHT AIRCRAFT

AFTER being, so far, solely concerned with the production of military types, North American Aircraft are now entering the market with an all-metal, four-passenger aircraft known, in descriptive phonetics, as the Navion. This low-wing cabin monoplane has a retractable tricycle undercarriage with a steerable nose-wheel, and is fitted with a Continental E.185 direct-drive flat six.

With the 185 b.h.p. available at 2,300 r.p.m., the maximum speed of the Navion is given as 160 m.p.h. and the cruising speed as 150 m.p.h. The maximum range is 700 miles, and the stalling speed 54 m.p.h. Only the first prototype of the Navion has so far been completed, and the type of airscrew, though originally quoted as being of variable pitch, has not been decided upon. The suggested price is £1,525 in the U.S.A.—which shows that such items as retractable undercarriages and v.p. airscrews add as much to an aircraft's initial cost in America as they are likely to do over here.

RE-ROUTING

THE Lancastrian service operated by B.O.A.C. in conjunction with Qantas Empire Airways between England and Australia was re-routed at the beginning of this week. This 63-hour schedule over the 12,000 miles between Hurn and Sydney which operates three times weekly in both directions is now routed via Singapore and Darwin on the Karachi to Australia section, instead of using the wartime route via Ceylon and the Cocos Islands. The new route has been made possible by the fact that the airfield at Singapore is now fit for heavy aircraft.

At the same time, Qantas have re-routed their Liberator service. This now runs twice weekly in each direction between Sydney and Singapore, so as to connect with the B.O.A.C. flying boat service to and from U.K. Previously the Liberators operated to Ceylon and connected with the R.A.F. transport Command U.K. services.

Since the Indian Ocean service between Australia and Ceylon was inaugurated in June, 1943, 1,013 crossings have been made, covering 4,125,000 miles and carrying 5,000 passengers. The loss of the Qantas Lancastrian on March 23rd, 1946, was the only mishap on this Indian Ocean link.

STRATOCRUISER AND RAINBOW

WITH the first deliveries to begin next year, Northwest Air Lines have ordered ten of the new Boeing Stratocruisers. Northwest propose to run a service to Alaska and to our "Far East," and examiners of the Civil Aeronautics Board have already recommended approval of this route.

The new Boeing is pressurised to provide sea-level conditions in the cabin up to a height of 15,000ft, and 6,000-ft conditions at 25,000ft. The four engines are Pratt and Whitney Wasp Majors with a current rating of 3,500 h.p. Northwest's Stratocruisers will be arranged to accommodate 70-105 passengers by day or with a special conversion for 16 sleepers and 43 seated passengers. Thermal de-icing is being planned, and the production aircraft will have reversible-pitch airscrews. To cover intervening operations, Northwest have acquired fifteen DC-4s.

Meanwhile, Pan American World Airways have ordered 18 Republic Rainbows. The first of these, again, are expected to be delivered next year. The "guaranteed" cruising speed of the new Rainbow is over 400 m.p.h., but no mention is made of the power percentage used.

SOUTH AMERICAN EXPRESS

A REALLY fast service to South America was inaugurated last Friday when a British South American Airways Lancastrian left the London airport at Heathrow for Rio de Janeiro, Buenos Aires and Montevideo. The new speeded-up schedule, which runs twice a week in each direction, shortens the time taken up by stops *en route*, so that the trip from London to Rio is accomplished without a night stop and takes only some thirty-one hours. In fact, the traveller who leaves London airport, for example, at mid-day on Friday, completes the entire journey to Montevideo by the following Sunday evening.

One immediate advantage of this accelerated service is that the London businessman can now travel to South America in a shorter time than can his New York counterpart. Furthermore, as these aircraft can carry a considerable quantity of mail, letters, too, gain a similar advantage. At the inauguration of the new service Air Vice-Marshal Bennett said that the reduction in the cost of air mail on this route to 1s 6d per ounce had already resulted in a tremendous increase in the quantity carried. The aircraft schedules are so arranged that, if an airmail letter delivered by this route is replied to promptly, this reply can catch the next return air service—a facility which may well save thousands of pounds on some urgent contract for the businessman who uses it effectively. Incidentally, B.S.A.A. expect soon to obtain their twenty-one seater Yorks and it is hoped that these may be put into service in May.

"Twelve by the clock, a cool night, slight precipitation, ten-tenths at two thousand, QFF 988, and all's well."

EMPIRE BOAT RECORD

TWENTY million miles flying has just been completed by the B.O.A.C. *C. Class* flying boats. Twenty-eight of these boats were ordered "off the drawing board" by Imperial Airways in 1935, at a cost of £1,750,000. This move was necessitated by the development of the Empire Air Scheme, and the Air Ministry agreed to the purchase of boats in quantity, in spite of the fact that there had been no opportunity to test them under practical service conditions. By the end of 1936, four flying boats were in commission, and others came into service in the subsequent years until eventually forty-two of them had been delivered to Imperial Airways by Short Brothers of Rochester.

The first C Class boat to be put into service was *Canopus* which is still in operation on the Horseshoe route to India from Durban. The other boats have given the most magnificent service in both peace and war, some having served with the R.A.F. In fact, during the war, the fleet of twenty-two ton flying boats suffered severe losses, and took a most important part in such vital actions as the evacuation from Crete, flying unarmed and often unescorted on these missions.

BREVITIES

The civil transport version of the Handley Page Halifax is to be known as the "Halton." The military transport version will continue to be known as the Halifax C.VIII.

* * *

The existing British air service to Spain is to be supplemented by a twice-weekly Madrid to London service starting in early May.

* * *

A Pan American Constellation flew over the "great circle" route from Tokio to Seattle a few days ago, making a flying time of 18hr 34min for the 4,800 miles trip. A stop was made in the Aleutian Islands.

* * *

K.L.M. fares on international services are to be reduced by 20 per cent from April 1st, when the company expects to make a considerable increase in the number of its services. Among the new services will be one from Stockholm via Copenhagen and Amsterdam to Geneva.

* * *

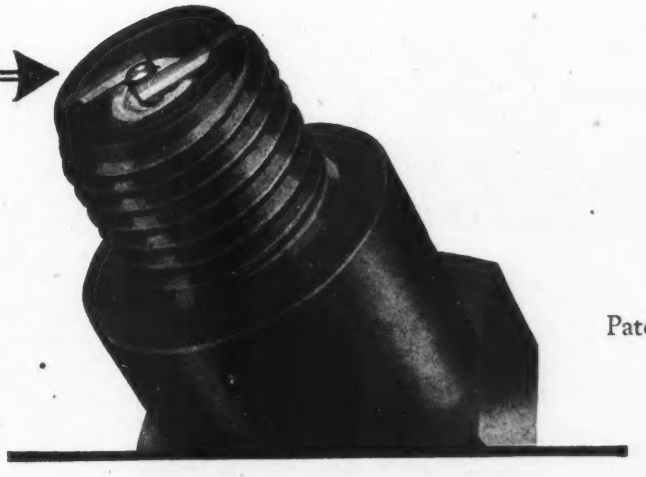
From April 1, travel to the Channel Islands has been unrestricted so far as air and sea facilities will allow, and it is no longer necessary for travel cards or visas to be obtained.

A war time secret

The process of electrically amalgamating the precious metal earth points to the steel body of sparking plugs, invented and patented by the makers of

LODGE PLUGS

was specified exclusively by the British Air Ministry for all aero engine sparking plugs.



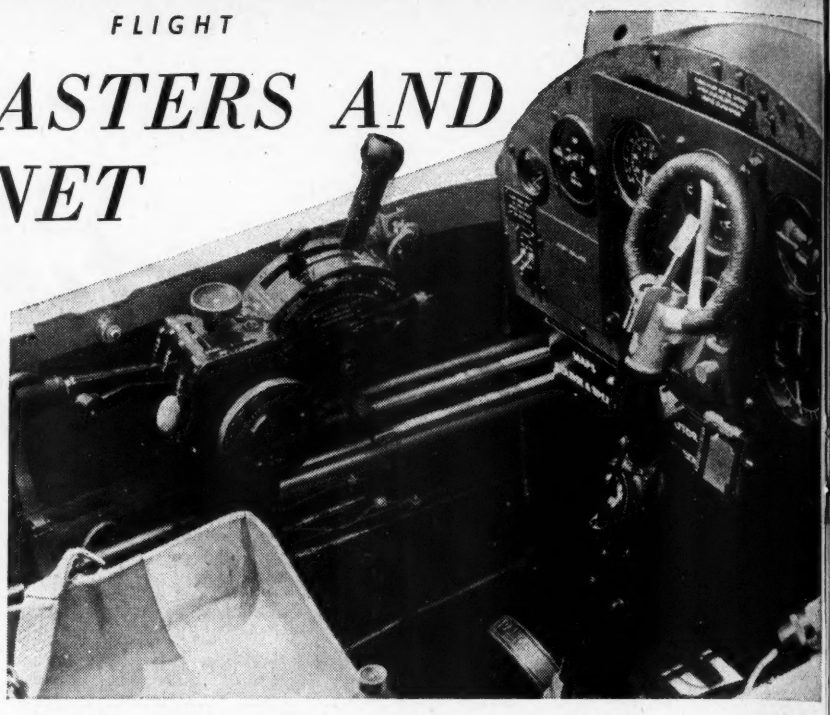
Patent No. 540537

Lodge Plugs Ltd., Rugby

THREE MASTERS AND A MARTINET

Impressions of a British Intermediate Trainer : Modern Control Grouping

By "INDICATOR"



UNLIKE the other ninety-nine per cent of wartime pilots of the Miles Master, I came to this aircraft only after spending many hours in more martial types and approached it as a comparatively experienced pilot rather than as a pupil. In those strange days of the early war years nearly everything we did was, so to speak, in reverse. After an hour or two in a Harvard and a Battle in order to become familiar with modern "drill," I was pitched into a Blenheim and did most of my flying in this and other twins before advancing towards the mastery of single-engined types. And I had put in several hours with early Spitfires and Hurricanes before I so much as saw the inside of a Master.

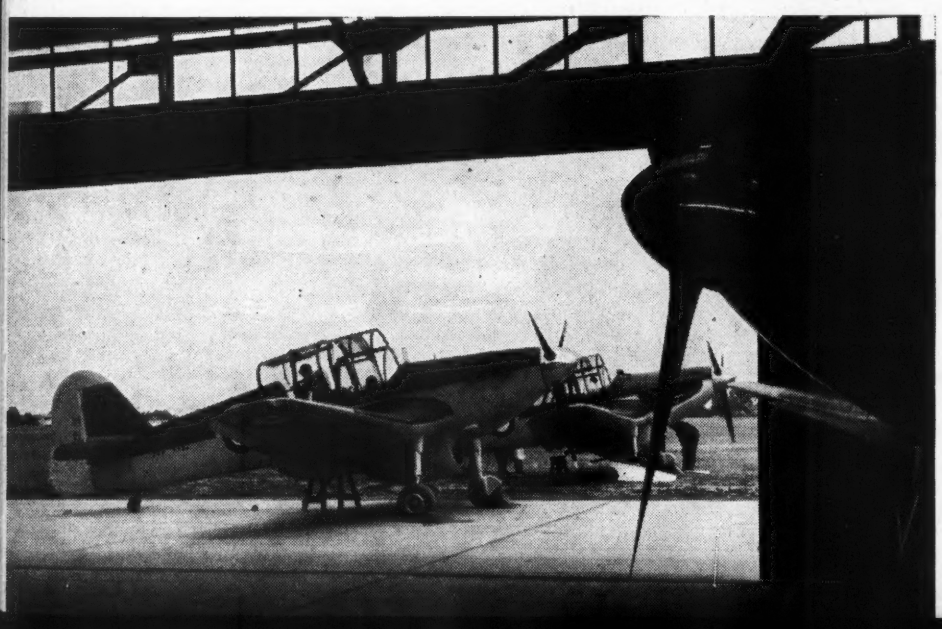
But this was in complete accord with the spirit of those topsy-turvy ferrying and testing years, when bright young men with polished reflexes were legally prevented from flying anything other than the type on which they were deemed to be officially proficient, while we, the white-haired limping amateurs in uniform, strode manfully from type to type and were checked on nothing but our ability to bring them back in one piece. It was in accord, too, with the remarkable fact that, during five years in the Service, I never once marched under instruction on a parade ground or learnt, other than by trial and embarrassing error, how one should behave on any officially inspected occasions. Which only shows how magnificently the British may disregard conventions and regulations when there is work to be done. In just the same way all the meticulous complications of R.A.F. Stores procedure were delightedly thrown on one side when a unit actually went to war.

IN THE AIR—XIII

So the Master, when it finally came into my life, was just another aircraft and not, as for so many others, my first experience of a full-powered and full-sized type. But, whatever the faults found in the various marks, and duly enlarged upon and exaggerated by aerobatic instructors and riggers airframe, I can say that I always tended to turn to a Master, if any were available, for weather testing, casual passenger-flying and on those occasions when, while suffering from the effects of an indisposition, I felt that I needed to fly only the simplest and least troublesome type to be found.

Although the very first of this type to be flown was a Master I with a Kestrel 30 engine, I will confine my attention largely to the II, with Mercury 20 or 30. Not that the Kestrel Master was necessarily inferior to the later marks, but because those I flew were always very dirty and worn-out affairs, ready for the scrap-heap or office stove after they had been finally turned in by an A.F.U.

Three initial impressions of the Master II are outstanding in my recollections of the type—which I last flew, I think, in the autumn of 1944. First, the excellent grouping and convenience of the hydraulic, engine and trimmer controls ; secondly, the "fey" manner in which everything seemed to happen at once on the take-off as the throttle was opened and the tail lifted ; and, thirdly, the view over the big engine cowling through the deep, narrow screen.



A pleasing impression of a couple of Masters in their original Kestrel-engined form. In those days the hoods opened sideways and were hinged on the starboard side.

The Mercury-engined Master II in solo or passenger-flying trim. When used for circuits and bumps the rear hood could be raised to form a deep screen for the enthroned instructor during the take-off, approach and landing: at other times he sat low in the closed rear cockpit and hoped for the best.

The control grouping—with the elevator and rudder tab wheels in the correct sense, the c.s. control well away from the throttle, and the undercarriage and flap levers all ready to hand at the rear of the pedestal—was remarkable since it was planned before such things were very seriously considered, and since no other manufacturer has ever quite succeeded in offering such convenience and simplicity in one fell swoop. Its only possible weakness lay in the fact that the undercarriage and flap levers lay side by side and, though the former was longer and had to be pulled out over a stop quite vigorously before lifting, it *was* possible for the absent-minded pilot to go through the wrong motions at the end of his landing run. Many pupils at O.T.U.s must have sat in the collapsed remains while wishing that they had never been born and praying that they would not find themselves grounded eternally by a fiercely moustachioed Commanding Officer.

Acceleration

The excitements of take-off—quite unnoticed in any later flying of the type—were caused partly by the quite phenomenal acceleration with such a high power-weight ratio, partly by the fact that, in spite of the use of full left rudder bias, the aircraft was still trying to rush smartly off the straight, and partly by the comparative sensitivity of the elevator control under the influence of the slipstream. The outfit was usually airborne before the pilot had really recovered from his first surprise, and was climbing smartly away with that high-pitched note peculiar to the Mercury. Most of the c.s. airscrews on the II were of the counter-weight type, with a limited range of pitch-change, and this fact certainly gave me a chance one day when the c.s. unit packed up on take-off and left me in full coarse while just airborne and with no runway left on which to re-land. I found that the thing clambered quite comfortably around, gaining height slowly, at 1,400 r.p.m. Incidentally, the specially different feature of the Master III, apart from the necessarily different engine controls for American carburation of the Twin Wasp Junior was, while taxying and taking off, the somewhat improved view over and around the smaller-diameter cowling. Otherwise there was very little to choose between the II and the III.

The general view from the II, though poor when the tail was down and probably better in appearance than in measurable fact, certainly seemed to be good. One sat high up, the screen was deep, and a full range of all-round view was provided through the easily moved sliding canopy which replaced the old original folding lid of the first versions. Apart from a short period during which, with a particular design of exhaust manifold, there was an official carbon monoxide panic, I kept the canopy closed at all times when airborne. I cannot say very much about the instructor's reactions in the back seat, with its lid-cum-screen and big range of seat adjustment, because only once did I attempt to fly it from this position. It was probably a comfortable one when dealing with a fairly competent pupil, but I had rashly left the front seat to a non-flying enthusiast, and it was some time before I could get him to understand that the undercarriage *could* only be retracted from his cockpit.

The over-critical pilot would probably have given the Master only seven out of ten marks on the score of "aerobatability," but, though a shade heavy on the ailerons and over-light on the rudder, it was quite good enough for my purposes. I found it advisable to pull the nose very high above the horizon when starting a roll, since otherwise this

Similar to the II except for the smaller-diameter engine cowling, the Wasp-engined III was not so often seen. Apart from the improved forward view, the type was good in that it taught pupils the handling points of a typical American engine

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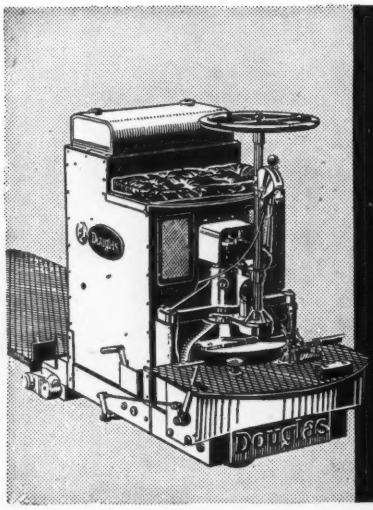

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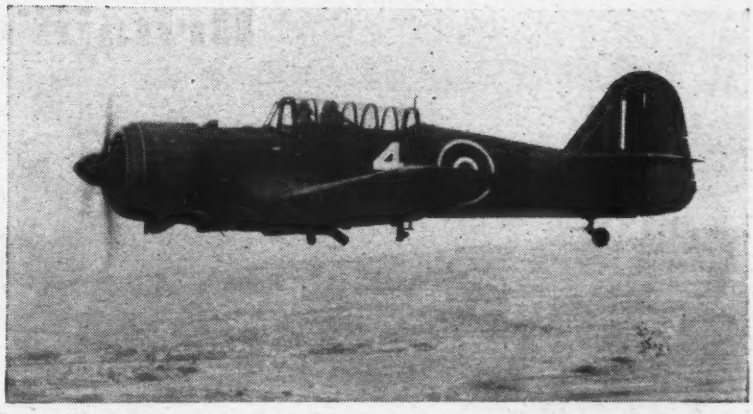
THREE MASTERS AND A MARTINET

manœuvre tended to finish in a rather untidy downhill recovery. Sometimes the ailerons would twitch rather forcibly if the rate of attempted roll was fast. Trimming of these surfaces was, curiously enough, organized by doping wood strips *under* the aileron trailing edge, in which position a good deal more than expected was needed to produce results. Similar strips were sometimes put on either side of the rudder, presumably to reduce the tendency for this control to flap about over small angles by itself.

With the possible exception of the Beaufighter, I cannot think of any other aircraft in which the drag effect of full flap was so usefully pronounced. There could be no possibility of over-shooting even the smallest field, and, with a burst of power to give one more time to organize the very considerable change of angle between the full-flap-engine-off glide and three-point attitude, the most astonishingly short landings could be made. The stalling speed of the Master with everything down was, in fact, a shade under the mile-a-minute mark, but it never felt even as fast as that—and certainly not when the thing was dropped quietly down on its wide-track undercarriage with a burst of engine. In spite of the very considerable ground angle, tail-wheel-firsters were more than possible if the final check was made too vigorously.

The brakes were operated from the normal hydraulic system and newcomers were occasionally disturbed by the apparently low pressures shown on the gauge—so much so that they were in the habit of repeatedly selecting flaps "up" or undercarriage "down" so that something visibly better could be temporarily built up in the way of pressure. Yet all of this excess pressure disappeared just as soon as the brake level was squeezed, and the pressure shown, though small on the 1,000-lb dial, was, in fact, quite ample. Air-pressure habits die hard. As with the Liberator, the taxying arrival of a Master was usually heralded by a series of sharp squeals.



Similar in general design and characteristics to the Master series, the Martinet target-tower had rather greater endurance and necessarily modified cockpit arrangements.

Although the Martinet is mentioned in the title of this article, there is no object in separating this type since the characteristics were almost entirely similar except, perhaps, for a slight and possibly imaginary difference in the trim effect of flap-movement. Otherwise this target towing affair was different, from the pilot's point of view, only in the tank arrangements. Whereas the Masters had a 35-gallon tank in each wing, the Martinet had two additional outer wing-tanks of 30 gallons so that it could stay in the air long enough for its target-towing duties.

THE NEW ROLLS-ROYCE CHIEF

JUST back from an air trip of 27,000 miles to Australia, India and Egypt, where he has been examining future British export possibilities for aircraft engines and cars, Mr. E. W. Hives, C.H., the new managing director of Rolls-Royce, Ltd., is well pleased with the prospects. He travelled all the way (accompanied by the Rolls Servicing manager, Mr. W. P. Calver) on Rolls-Royce engines (in Yorks and Lancastrians), and "they never missed a beat," remarked Mr. Hives, who arranged his programme five weeks in advance and kept all his appointments throughout to the day and the hour.

The new Rolls-Royce managing director is a worthy successor to the high office of chief of this great British company. Retiring in character, of his wonderful record of service little is generally known outside the Rolls factories, in the business of which he has been so deeply immersed. He joined the Rolls-Royce company in 1908 and was closely associated with the late Sir Henry Royce.

By 1912 his name was linked with the now-famous Rolls-Royce experimental department, and during the 1914-1918 war his activities, hitherto mainly concerned with the development of the Silver Ghost and Alpine model Rolls-Royce cars, were transferred to the aircraft division, from which emerged the "R" engine, that vital key to British victory in the Schneider Trophy Race. In 1936 he became general manager, and works director on the death of A. H. Wormald, and the success of the range of 25 h.p. and Phantom cars bore eloquent testimony to his resumed interest in the automobile side of the business.

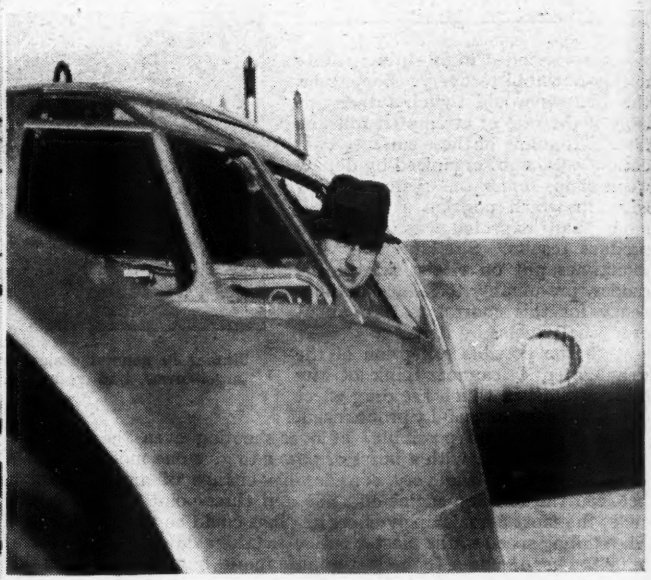
Not, however, until the advent of the war of 1939-1945 was the productive genius of Mr. Hives to find full and effective scope, and it is true to say that a large contributory measure of the success of the Battle of Britain was due to the marvellous efficiency exemplified in the Merlin-engined aircraft with which R.A.F. pilots earned that so rarely-correctly-quoted immortal Churchillian laudation, epitomising the debt of the many to the few.

When the expansion programme was embarked upon, the first Merlin engine was completed at the Crewe factory in May, 1939 (within twelve months of cutting the first sod of earth for the foundations), and six months later the first aircraft engine emerged from the Glasgow factory, again a bare sixteen months from first breaking ground in June, 1939. The terrific drive, under the leadership of Hives, of production of Merlin and Griffon engines followed. In 1943 the combined Crewe, Derby and Glasgow factories reached an output of eighteen thousand, nine times the 1939 figure! In that year the name of Mr. Hives was enrolled as a new Companion of Honour, that rare and select award for unparalleled service to King and Country. In him we have a great British trade ambassador as well as a production genius. During the war years he twice visited the U.S.A. and Canada, and during his recent extensive air journey to India, Egypt and Australia he visited the factory at Melbourne, Australia, which is producing the Merlin engine.

Mr. Hives says goodbye to the pilot, Capt. Gregory, at Hurn airport.

The appointment of Mr. Hives as managing director of Rolls-Royce, Ltd., in succession to Sir Arthur Sidgreaves, can but add lustre to an already illustrious trade name.

Britain's Test Pilots



(Left) J. L. Parker at the age of 18, seated in the nacelle of the 50 h.p. Waterhen at Windermere in 1914. This aircraft also rejoiced in the expressive name of "Peter Out". (Right) About to fly the prototype Short Sunderland in 1939.

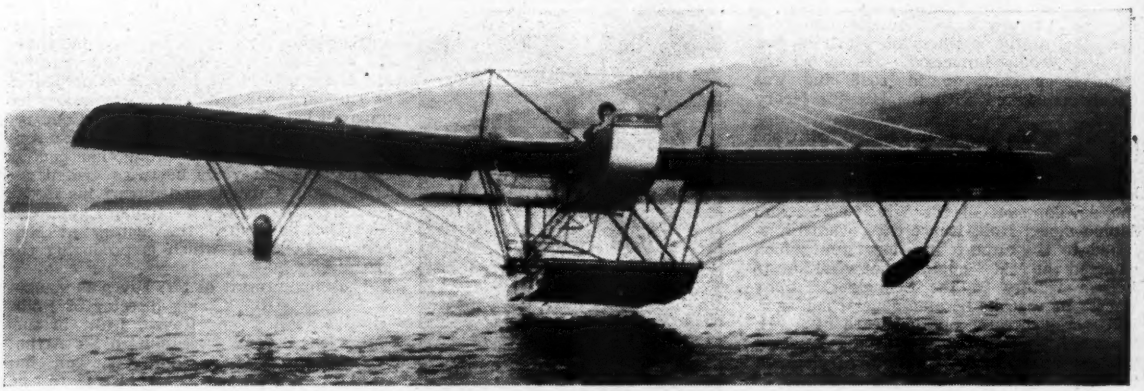
No. 4—J. L. LANKESTER-PARKER, O.B.E.

IF any young man to-day thinks he is keen on flying, let him read this story of one to whom flying has been his very life.

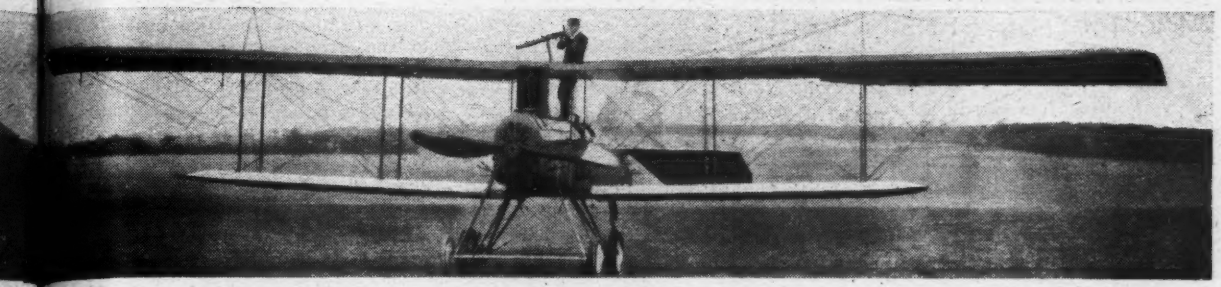
After spending about a year in the family flour mills in Suffolk, John Lankester-Parker decided that that life was too dull, and the end of 1913 saw him as a paying pupil at Vickers Flying School at Brooklands. In common with other flying schools of that period, Vickers' charge for teaching a pupil to fly up to R.Ae.C. ticket stage (three landings and a figure of eight) was £75. Since it was just flying he wanted, Parker strung his instruction out as long as he could, but was finally made to fly for his certificate (No. 813) on June 18, 1914.

The aircraft used were open pushers—no cockpit or fuselage—Vickers built Bristol Boxkites with 50 h.p. Gnôme rotary engines. They had drooping ailerons, which gradually rose to the flying position as the machine gathered speed on the take-off. They also had a front elevator. There was, with the Gnôme engine, no throttle. It was either switched on or switched off; there was no other control than this so-called "blip switch," and one had to remember to stuff the nose well down before switching off the engine. If one forgot, the nose went up and the boxkite stalled. Top speed was 33 m.p.h., and landing speed 25 m.p.h.

The instructors at Vickers at this time were Capt. H. Barnwell (elder brother of the late chief designer of the Bristol Aeroplane Co.) and Mr. Knight, who held certificate No. 10. Although the machines were two-seaters—that is to say, had two open bucket seats, and the fliers tucked their trousers in the top of their socks to stop the draught going in at the ankles and out at the cuffs—there were no dual controls. The pupil just watched what the instructor did, and was eventually allowed to fly in the pilot's seat. John well remembers his first attempts and being told to steer for some particular advertisement hoarding. He is always proud of the fact that he flogged one of these contraptions up to



Flying the Gnosspelius pusher seaplane, 50 h.p. Gnome rotary engine, in 1914.



The Short 225 bomber on which Parker was invited to break his neck. Note the position of the air gunner. Span, 85ft. Military load, 8 × 112 lb. bombs.

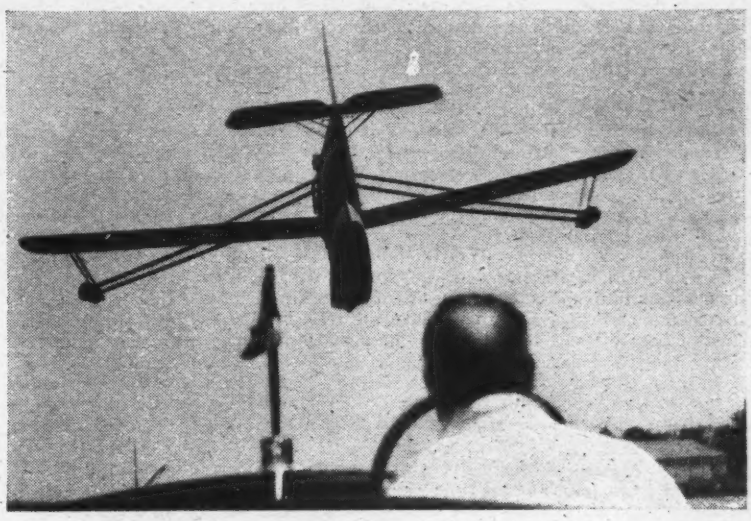
1,450ft, which was at least 200ft higher than any other pupil had taken one, and the loneliness brought on by the effect of remoteness at that considerable height almost frightened him.

At the end of 1914 he went to Hendon to the Hall School of Flying as an instructor, but as there was at that period only one machine available, he decided to go to Windermere to try his hand at seaplane flying. It should be remembered that Parker has a game leg which precluded him from entering any of the Services in the 1914-18 war.

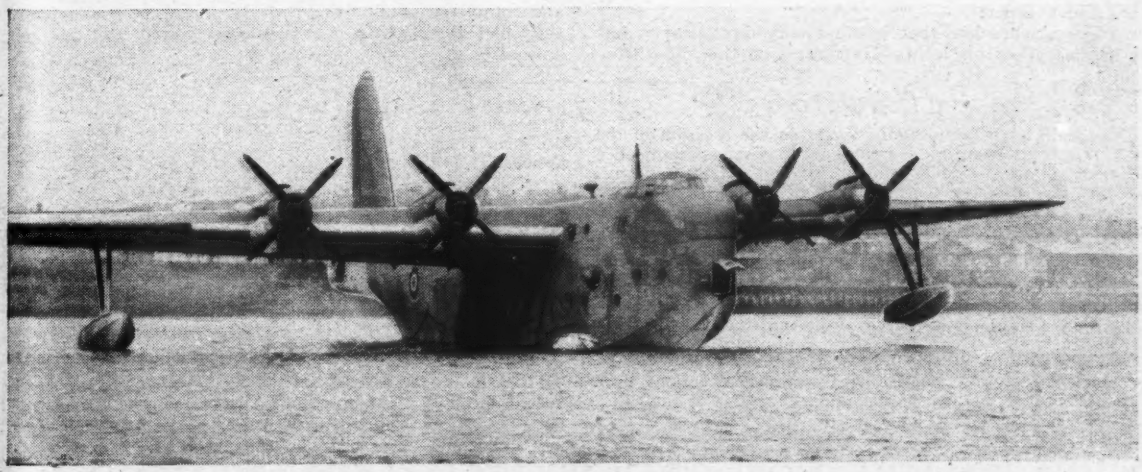
The Last £25

Flying the Waterhen at Windermere cost £10 per hour, and Lankester-Parker arrived with his last £25; booking two hours' flying. Rowland Ding—an exponent of the Handley Page aircraft of those days—was the instructor. In the Waterhen the pilot was in front and the pupil sat behind, leaning over to take the controls. The front elevator, which was interconnected to the rear elevator, was badly overbalanced; the first take-over surprised Parker a good deal and Ding even more. Parker was grounded for hamfistedness.

Ding then went off for the week-end, leaving behind a number of disgruntled pupils. Without more ado Parker got the machine out and, taking up pupils, put in 50 flights that week-end—an unprecedented number in such a short while. Having decided it was no worse to be killed for a sheep than for a lamb, he even sent one pupil solo. Contrary to expectation, on his return Ding was delighted. After such a performance Parker was appointed an instructor without pay. He took this on purely for the sake



Experimental prototype. The Short Mussel which Parker flew in such a variety of forms as a normal twin-wheel aircraft, a twin-float seaplane, a single-float amphibian and as a one-wheel landplane.



The Short Shetland which was the last prototype on which Lankester-Parker made the first flights.

BRITAIN'S TEST PILOTS

of getting in more flying. He had no money to pay for digs, so he lived and slept in the corner of a hangar. He even sold his bicycle to keep going, and by these means and economies he survived about three months.

Rather than lose a good instructor the school then paid him a salary of 30s. per week, and later, much to his surprise, suddenly and without any warning, this was increased to £6. He taught about 75 pupils to fly without any being killed—somewhat of a record for those days. The Northern Aircraft Co., for whom he was flying, was then taken over in 1916 by the Admiralty for war purposes. Rear Admiral Murray Sueter came to Windermere to complete the arrangements. Murray Sueter asked Parker whether he would like to be a test pilot for a friend of his, and that friend turned out to be Horace Short—the eldest of the three Short brothers.

At the first interview Horace Short accused him of infringing a patent dealing with the ignition on a motor bicycle Parker was riding. Mr. Short then gave John a job, but told him he wasn't going to allow bits of boys to fly his aircraft. This didn't suit the enthusiastic young Parker and, after a stormy passage with Horace Short, he came up the next morning to collect his few odds and ends, ready to clear out and try elsewhere. Mr. Short had by this time relented, and told Parker that there were four aircraft on which he could go and break his neck if he wanted to. Parker test-flew all four of those Short-225 bombers in one day. It was part of the contract that an Acceptance Officer had to fly with the test pilot, and it was rather difficult to get the backing of these A.O.s. Parker joined the chosen few by bringing off a forced landing in a small field after an engine seizure at 8,000ft. As he says, "the A.O. didn't realize that where I intended to land was a big field some three fields further back."

Tail Smashed Off

The chief test pilot at that time was Ronnie Kemp, and for some while Parker did a lot of free-lance flying, with Shorts having first call on his services. He flew Norman Thompson flying boats, Sopwith Pups and a few prototypes, including the Maurice Farman seaplane and the first Supermarine flying boat.

It was on one of the Norman Thompson flying boats that he nearly lost his life. He was delivering one from Middleton to Southampton, and was out of sight of land when the pusher airscrew came adrift and completely smashed the tail. The boat fell into the water, fortunately without injuring Parker, who clung to the wreckage for some eight hours before being picked up by a paddle-driven Clyde pleasure steamer which had been converted to a minesweeper.

An experience like that would satisfy most people, but it had no effect on John. He carried on this same free-lancing until January, 1918, when he joined Short Bros. as Chief Test Pilot. His first Short prototype was the Shirl, which was a landplane carrying a torpedo weighing 1,422¾ lb. To show what was expected of test pilots then, here is a day's work in 1918 at the Isle of Grain. Ten a.m., Shirl test-flown for 5 min. Tailplane then set up 4 deg. because aircraft was tail-heavy. Another flight at 4 p.m. to test for tail-heaviness. Third flight same day to deliver aircraft to East Fortune in Scotland, arriving at 8.35 p.m.

From the Shirl right up to the Shetland, Lankester Parker has done all the first flights on new Short types. Being such a progressive firm, Shorts produced a variety of types, and these flights have not been without incident. The Scion, a landplane flying scale model of the brilliantly conceived C-class boat, was tried without ailerons but with small Gouge flaps which came out as the stick moved. The machine started a slow roll as it left the ground, and was only saved by pushing the nose down, straightening out, switching off and landing, all in a matter of seconds.

Aileron Overbalance

On the Gurnard, too, he had a very exciting minute. It was the first Short aircraft to have Frise ailerons, and these particular ones proved to be hopelessly overbalanced. Immediately on take-off it did three 45 deg banks in each direction, smashing Parker's hands against the sides of the fuselage as he endeavoured to control the stick. With the stick between his knees, and using all his strength, he just managed to land the Gurnard—scarcely one minute after take-off.

One of his most interesting jobs was the Mayo Composite, which was a heavily-loaded seaplane mounted on top of a flying boat. The idea was to launch the upper component in mid-air, using the lower component solely for assisted take-off. It was like three prototypes—the separate machines and the two flying together. Queer happenings occurred. Both aircraft were flown to get trim and throttle co-ordination at 140 knots, and then it was found that the two together, forming a dirty biplane, would not fly at 140 knots. Even the position error for the separate components differed by over 10 knots from that of the composite aircraft.

Twice Parker has been the guest of the Japanese Navy. First in 1921, when he took out some wooden-hulled F5 flying boats, and again ten years later, in 1931, when Shorts sold the Japs the design and prototypes of the K.F.1 flying boat, which had three Rolls-Royce Buzzard engines and weighed 40,000 lb. He noticed a very great change in the Japs in those ten years, and it was obvious that something was afoot.

During this last 1939-45 war Short Bros. have had a dispersal factory at Windermere, where Parker did much of his very early flying. Thus the circle becomes complete and, having done the first flights on the Shetland and completed about 5,000 hours of flying, he has handed the Chief Test Pilot's job over to Geoffrey Tyson. He is now sales director of the company.

J. Y.

STILL SPOTTING

TO facilitate the handling of traffic on the occasion of the "Grand National" at Aintree last Friday, the police made use of an Auster aircraft equipped with radio-telephony. Fortunately, visibility was good, and the "A.O.P." was able to put the ground forces "on target" when a bottleneck in the traffic converging on the course was observed.

EFFECTS OF BRITISH AIR ATTACKS

ALMOST every part of Europe outside the Russian zone has been included in the investigation carried out by the R.A.F. British Bombing Survey Unit into the effects of our air attack.

Surveys have been carried out of underground factories, the economic structure of Germany, German fortifications, war production and fire-fighting equipment, and National Fire Service experts are now collating the facts concerning civilian casualties in fires.

Thousands of documents of all kinds, including German meteorological records, have been studied. One team of experts sent to Nuremberg to assist the War Crimes Commission also extracted from personal war diaries and other documents information such as the effects of enemy strategy and tactical decisions which appeared to have been influenced by our air attacks.

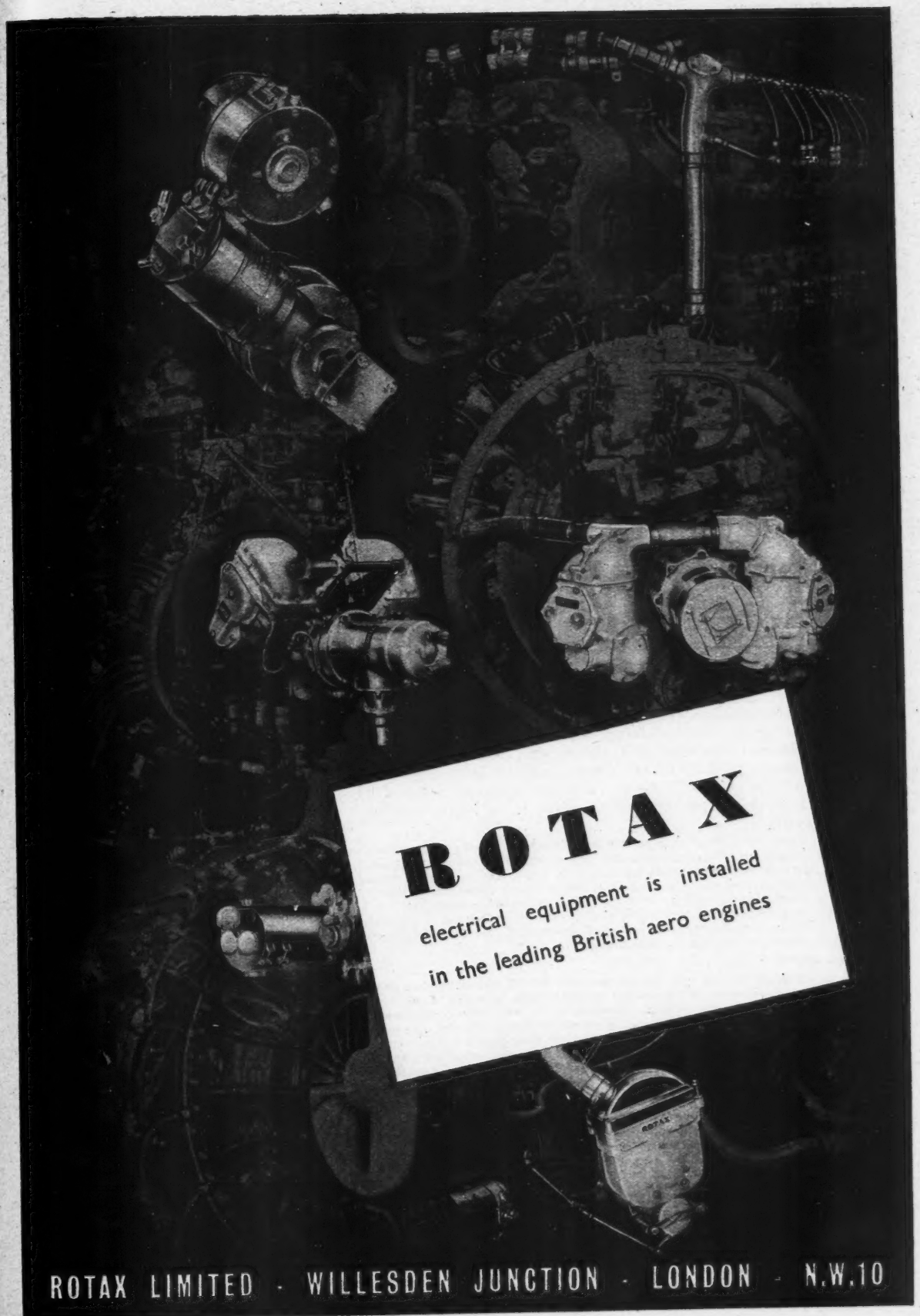
HELPING THEIR COMRADES

THE R.A.F. Benevolent Fund has received a cheque for £118 11s 7d from the C.O. of No. 53 Squadron, R.A.F., and the honorary treasurer of the fund, Sir Bertram T. Rumble, has asked *Flight* to express, on his behalf, his thanks to all members, past and present, of the squadron for their generous support of the Fund and its work.

A "COOK'S" PIONEER RETIRES

HEAD of Thomas Cook and Son's travel department since its introduction in 1919, Mr. Charles Percy Burgess, who has been with the famous travel agency for over 50 years, has now retired at the age of 71.

Last week he was the guest of honour at a lunch in London attended by representatives of most of the chief British airlines, and was presented with a silver cigarette casket.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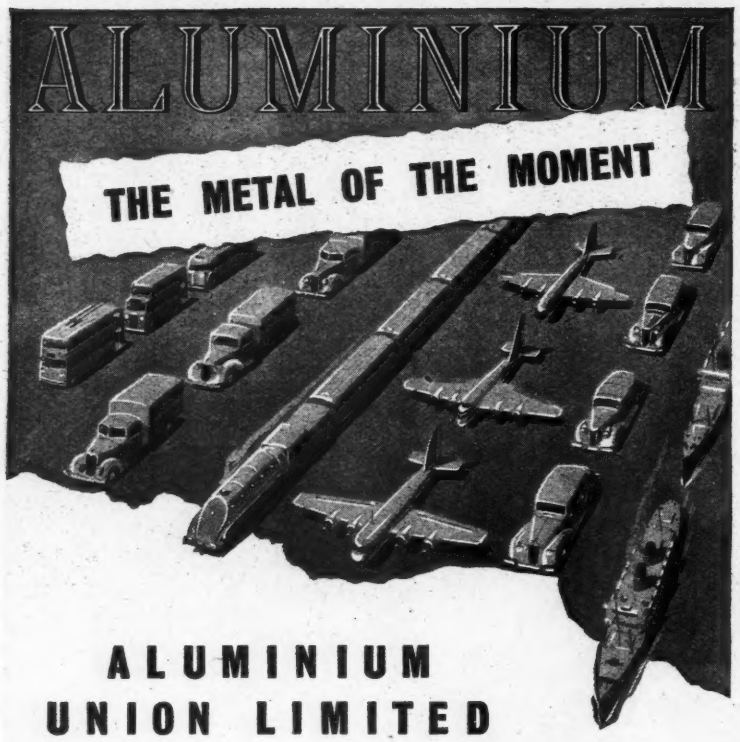

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ERB

Power Units for Future Aircraft

Piston Engines : Fuel Choice : Plain and Airscrew Turbines

By AIR COMMODORE F. R. BANKS, C.B., O.B.E.

ON Monday, April 8th, at the Société des Anciens Élèves des Écoles d'Arts et Métiers, a lecture by Air Commodore F. R. Banks, Director of Aero Engine Research and Development, M.A.P., on the subject of Power Units for Future Aircraft, was delivered before l'Association Française des Ingénieurs et Techniciens de l'Aeronautique (AFITA). We here reproduce part of his paper, omitting those sections which deal with historical or current details likely to be familiar to readers of "Flight."

THE piston engine has served us well for some forty years, but its place is about to be taken by the gas turbine. The transition time will be about fifteen years. There is, however, one requirement which the turbine cannot yet meet, and this concerns fuel economy. For moderate cruising speeds around 300 m.p.h. and at altitudes of 25,000 ft. and below, the piston engine must still be considered where long range is wanted.

Aircraft of extreme range, say 10,000 miles, or having a radius of action of 3,000-5,000 miles, are necessary for certain military purposes, and I cannot see the gas turbine filling this need for some seven to ten years. Even the piston engine, for a range of 10,000 miles, must be developed to give considerably better fuel economy than it now does. I am thinking of the present cruising fuel consumption of 0.45 lb/b.h.p./hr and, in some cases, 0.41 lb/b.h.p./hr. To obtain a reasonable payload and to avoid oversize aircraft, built mainly to accommodate the fuel, a cruising fuel consumption of not greater than 0.35 lb/b.h.p./hr should be the target.

To achieve a fuel economy of this order some form of "compounding" is necessary to give a higher expansion ratio to the working cycle of the engine. The obvious method of attack is to utilize more fully the energy of the exhaust gases. We can, by using ejector-exhaust systems, obtain measurable propulsive effort, and so help to reduce the effects of drag; but this would not, in my opinion, give the overall improvement in fuel economy required for large aircraft of extreme range.

Compounding can be done by three methods:—

(a) An exhaust-driven turbine geared directly to the engine crankshaft by double-reduction gearing, and incorporating an "overrun" device.

(b) An exhaust turbo-supercharger.

(c) By exhausting pairs of working cylinders, alternately, into a low-pressure cylinder which is directly connected to the main crankshaft or to a separate crankshaft geared to the main shaft. A similar scheme to the latter has already been suggested by Prescott at Wright Field, U.S.A.

Of the three methods, I favour (a). But if relatively high-altitude operation is a requirement, then there is little alternative to (b). When considering methods (a) and (c), the former should be considerably lighter than the latter; although engine weight is not a primary factor for extreme range, and the main considerations must be reliability and economy. There should not be any particular difficulty in designing and developing a reliable turbine and gearing for scheme (a). In the case of (c), the mechanical, or frictional losses would be higher than those of a turbine arrangement.

Air Comdre. Banks then stated that a new design of piston engine might come too late in view of gas turbine advances, but he visualized two lines of development had this not been the case. These were a compound engine with a long stroke and a bore of, say, 8in, and a two-stroke power unit.

There is a case for the two-stroke engine, but only if compounding is employed to make full use of the exhaust-gas energy. By this means, a high degree of economy can be achieved, and a cruising fuel consumption of, say, 0.37 lb/b.h.p./hr is possible with a gasoline two-stroke/turbine combination and of about 0.32 lb/b.h.p./hr for a similar combination arranged for compression-ignition heavy-oil operation.

There is also the free-piston engine, of which the Pescara is the classic example; but I consider that the principal value of this type is for industrial and marine purposes. To develop a gas generator such as the Pescara and combine it with a

A.58

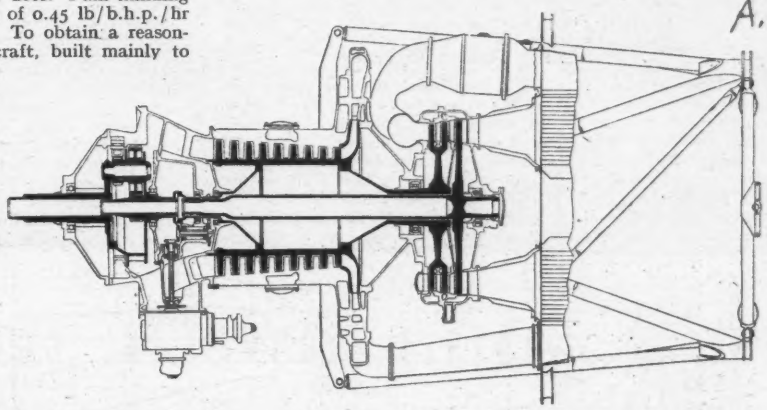


Fig. 1. (Right) On the Theseus I airscrew/turbine, a two-stage turbine drives both axial and centrifugal compressors, while a separate turbine drives the airscrew. A heat exchanger is incorporated and the weight is 2,500lb. At 9,000 r.p.m., 1,950 shaft h.p. and 500lb static thrust are produced.

A.57

Fig. 2. (Left) The R.-R. Clyde. The forward turbine drives the centrifugal compressor, and the separate rear turbine, the axial compressor and counter-rotating airscrews. Power figures are 3,000 shaft h.p. plus 1,200lb static jet thrust at 6,000 r.p.m. The dry weight without airscrew is 2,500lb.

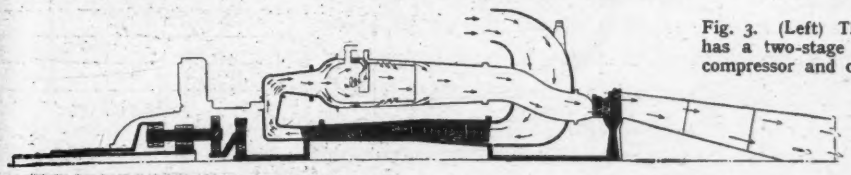


Fig. 3. (Left) The Armstrong-Siddeley Python has a two-stage turbine driving an axial-flow compressor and counter-rotating airscrews. The weight without airscrews is 3,140lb and the power at 8,000 r.p.m., 3,600 shaft h.p. plus 1,150lb static jet thrust.

POWER UNITS FOR FUTURE AIRCRAFT

turbine is a long job; which may not be completed before a gas turbine proper of high economy arrives.

Returning to the question of developing existing engines to give economical operation. Individual cylinder injection (of fuel), either directly into each cylinder or into the inlet valve port, close to the inlet valve, is recommended.

Considerable trouble has been experienced with the normal carburation systems and also with single-point injection at the eye of the blower, due to mal-distribution of the air/fuel mixture to the cylinders. This trouble is more prevalent with in-line than with radial engines and, particularly, when operating for maximum economy where the engine speed is much reduced and the mixture temperature is low. The heavy or high-boiling fractions of the fuel go to some cylinders and the lighter or low-boiling fractions into others. The heavy ends take with them a large proportion of the tetra-ethyl lead and little of the halogen bearer, ethylene dibromide. The lighter fractions are robbed of the lead, but are accompanied by a high proportion of the ethylene dibromide.

The result of this physical inequality is to give a high rate of deposition of combustion products in those cylinders receiving the large proportion of heavy ends and tetra-ethyl lead; usually causing sparking plug fouling by lead compounds, which, in turn, leads to rough running and vibration.

In order to obtain the best results, both as regards reliable operation and freedom from frequent ground inspection between servicing periods, and to make the best possible use of the anti-knock qualities of the fuel, direct injection to the individual cylinders is, in my opinion, essential.

Fuels for Piston Engines

There is little I can add to that already known about fuels, but since the emphasis in future will be on fuel economy, this may mean a weak-mixture rating higher than the present standard aviation fuel of 100/130 grade. Fuels of the following ratings could be made available, at a price, if desired.—115/145, 125/165, 135/170, and perhaps 150/200. It must be appreciated, however, that such fuels, particularly the very high gradings, would have restricted production and be costly to produce. For special purposes, however, on a particular route such as the Atlantic crossing, the extra cost of the fuel might be outweighed by the benefits of increased payload, always supposing that the fullest use is being made of the fuel qualities.

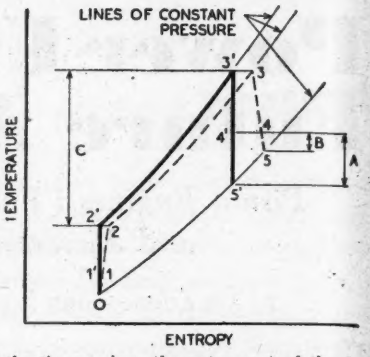


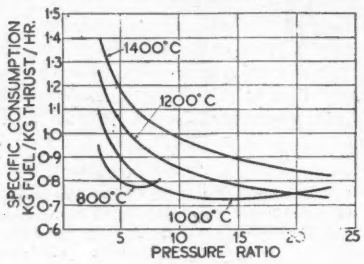
Fig. 4. Thermodynamic cycle for the gas turbine. The dotted and solid lines indicate the cycle with and without thermodynamic losses respectively.

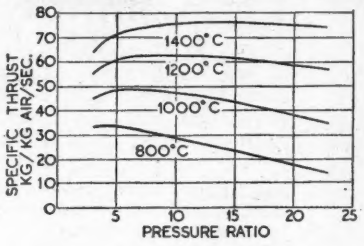
The development of direct injection opens the way to the use of the so-called "safety fuels." These are high flash-point fuels of 100 deg. F (38/40 deg. C) having much the same anti-knock properties as present aviation fuel. There is a greater danger of explosive fuel/air mixtures in the aircraft tank with them than with the more volatile fuels used at present, and this would have serious disadvantages, unless the aircraft fuel tanks were "blanketed" with some inert gas, such as carbon dioxide or nitrogen.

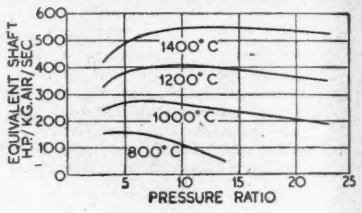
Air Comdre. Banks here turned his attention to the gas turbine, giving a brief review of its principle and development, and mentioning the turbo blower. He briefly described the R.R. Derwent V, D.H. Goblin, Armstrong Siddeley Python, Bristol Theseus, and R.R. Clyde.

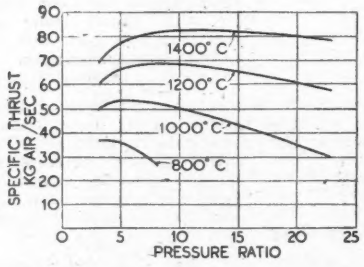
The specific weight of a simple turbine/jet engine is about 0.3 lb per lb of static thrust. Airscrew/turbines will have somewhat higher weight, between 0.75 lb and 0.90 lb per equivalent shaft horsepower.

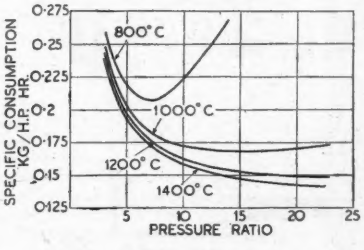
Gas turbines work on the "constant pressure" thermodynamic cycle. And this can be demonstrated more clearly by a temperature/entropy diagram (Fig. 4). Referring to the diagram; the full line (o, 1', 2', 3', 4', 5') represents the theoretical cycle, assuming no losses. Atmospheric air, in a condi-

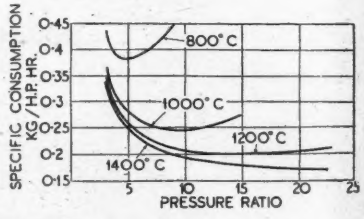


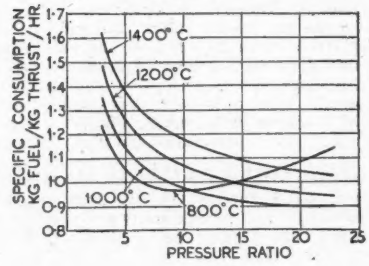








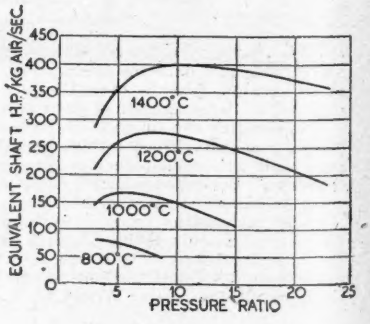


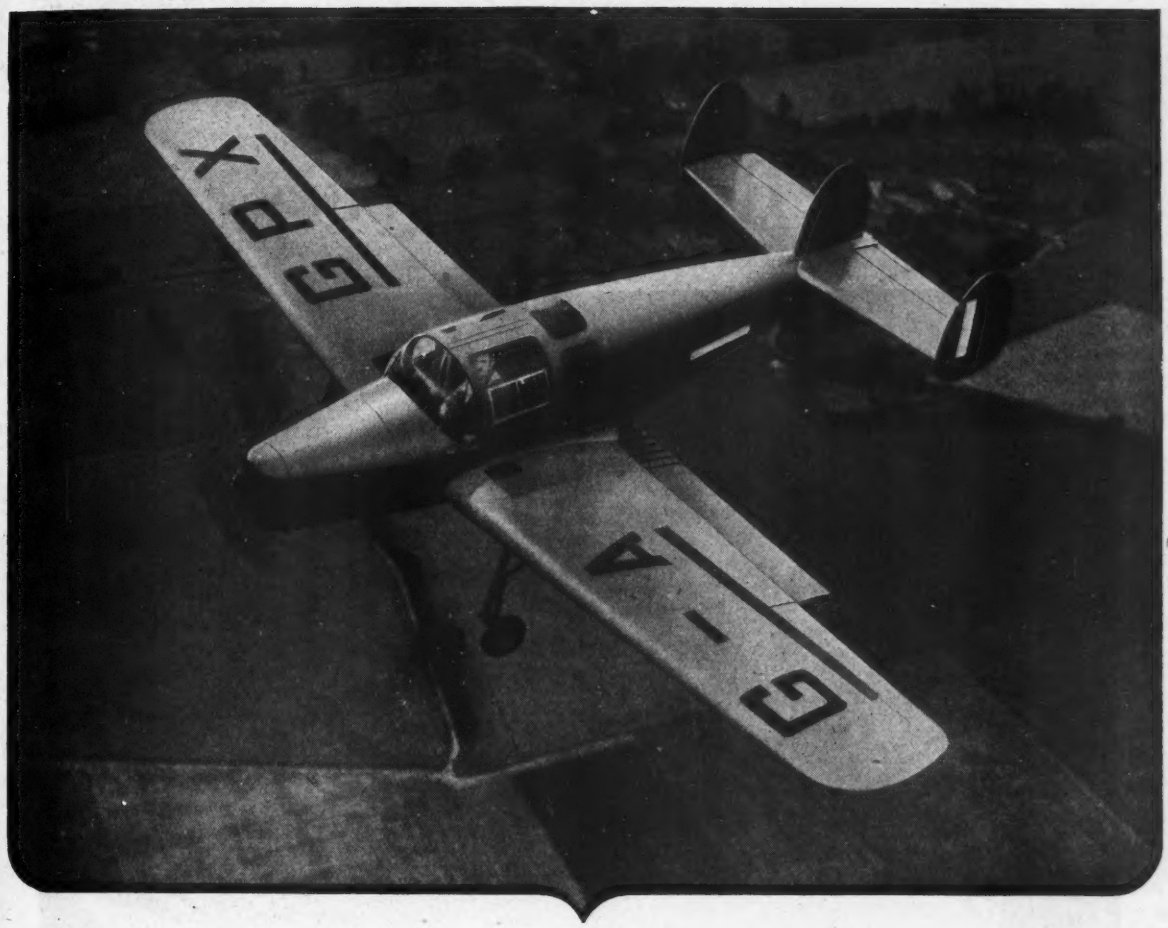


(Key to Figure Numbers)

Left 5	Above 8	Right 10
„ 6	„ 9	„ 11
„ 7	„ –	„ 12

Output per unit rate of air flow and specific fuel consumption for the simple jet (Figs. 5 to 8), and the airscrew-turbine unit (Figs. 9 to 12). Figs. 5, 11 and 12 refer to sea-level static conditions, and Figs. 6 to 10 are for 800 km/hr (500 m.p.h.) (I.C.A.N.) at the tropopause (36,000ft). Temperatures are in degrees C. absolute.





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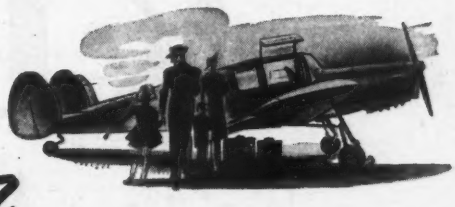

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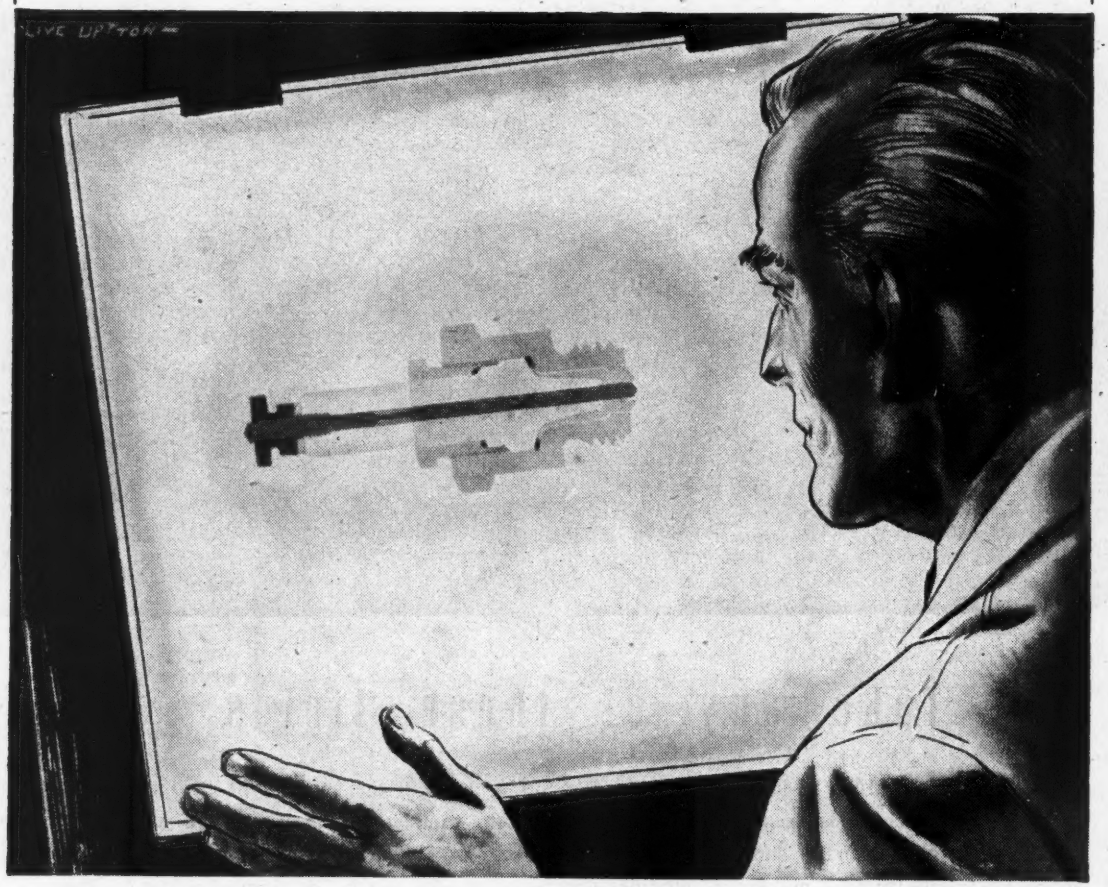

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tion represented by point o, is raised in temperature and pressure to conditions corresponding to point 1′ by the effect of "ram." Point 2′ is reached after the air has passed through the compressor. From 2′ to 3′ heat is added at constant pressure, in an amount proportional to the temperature difference, C. The gas is then expanded from 3′ to 5′ where the pressure is, again, atmospheric.

The energy available in the expansion is proportional to the temperature drop from 3′ to 5′. A proportion of this energy 3′ to 4′, equal to 1′ to 2′, is required to drive the compressor. And the remaining energy, 4′ to 5′, proportional to A, may be used, in jet form, to propel the aircraft, or some may be converted into shaft power by means of a turbine.

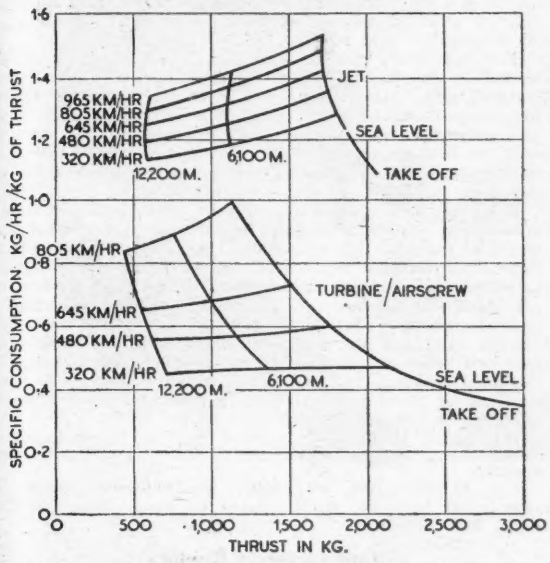

Fig. 13. Characteristic fuel consumption/thrust curves at speeds from 200 to 600 m.p.h. at sea level, 20,000 and 40,000ft. (1 kg. = 2.20 lb).

The actual cycle, with losses taken into account, is shown by the dotted line (o, 1, 2, 3, 4, 5). With the same input of work into the compressor, the resultant pressure at 2 is lower than 2′, and, because of this lower pressure ratio, also, due to the losses during expansion, the available energy in expansion, 3 to 5, is much smaller. The work required to drive the compressor is, however, unaffected and, consequently, the useful net energy available, 4 to 5, proportional to B, is much reduced. The thermal input for both the cycles shown is proportional to C. Therefore, the thermodynamic efficiency of the cycle, with no losses, is $\frac{A}{C}$ and, with losses, is $\frac{B}{C}$.

The diagram shows the great importance of achieving low losses in the compressor, turbine and combustion chamber to obtain good efficiency in the gas turbine as a whole.

The temperature/entropy diagram may be used to illustrate the effect of increasing compression ratio and gas temperature at the inlet to the turbine. But I also show, in Figs. 5-12, some results of calculations on these effects. In the case of the airscrew/turbine, it will be seen that, as the turbine inlet temperature is increased, the specific consumption decreases, and the specific output rises. As the pressure ratio is increased, at a given turbine inlet temperature, the specific consumption passes through a minimum and the specific output through a maximum. But it will be noted that these two optimum points do not occur at the same pressure ratio. This is particularly marked in the curves for 800 and 1,000 deg C absolute, and is due to the increasing effect of losses in compression and expansion which offset any thermodynamic gain.

The effect of pressure ratio and temperature on the performance of simple jet engines, shown in Figs. 5-8, is complicated by the additional factor of propulsive efficiency. The specific thrust varies in approximately the same way as the specific power output of propeller turbines. The specific consumption, however, generally rises as the temperature increases. This is the result of decreases in propulsive efficiency, which occur when the jet velocity is increased.

At any given temperature there is an optimum pressure ratio, which is shown most definitely on the curves for 800 deg C absolute. But, for temperatures now used, this occurs at a large value of the pressure ratio which is above that giving the maximum thrust.

The curves in Figs. 5-12 have been constructed for the following conditions:—

Compressor polytropic efficiency	= 87 per cent
Compressor turbine overall efficiency	= 87 ,, ,,
Jet pipe expansion efficiency	= 95 ,, ,,
Power turbine efficiency	= 88 ,, ,,
Assumed propeller efficiency at sea level	= 75 ,, ,,
at tropopause	= 74 ,, ,,
Equivalent jet brake horsepower at sea-level static	= $\frac{\text{jet thrust}}{2.5}$
Combustion chamber pressure loss in lb/sq in	= 2 × relative atmospheric pressure

Following these considerations, I give, in Fig. 13, characteristic curves of fuel consumption against thrust at different speeds from sea level to (approximately) the tropopause; for (a) a simple jet engine of the "Whittle" type and (b) an airscrew turbine having two compressors, in series.

To give some idea of the working conditions inside a simple jet engine at normal maximum speed, I am showing sections through one combustion chamber of the Rolls-Royce "Derwent" engine, as representing a typical "Whittle" type, giving the particular conditions existing throughout its system when it is running. (Figs. 14-17.)

Turbines with Ducted Fans

There is also the turbine/jet engine with an augmenter or ducted fan. This takes the form of an axial type fan in an annular duct surrounding the main turbine. The fan can be connected to a ring of turbine blades, which are located in the gas stream behind the turbine proper. Another method is to drive the fan mechanically (through gearing) and locate it at or near the air entry of the compressor. The fan duct surrounds the engine and is carried rearwards where it can discharge as an annular jet or into the jet pipe proper, to mix with gases there. One of the advantages of locating the fan at the compressor entry is that some degree of "ram" or supercharge is given to the air entering the compressor.

In the case of the simple jet, the ducted fan and the airscrew turbine, their propulsive efficiency is highest when there is least difference in speed between their respective "discharges" and the aircraft in which they are fitted. This assumes that efficiency is assessed on a change of kinetic basis, where input per lb of air flow is equal to the jet, or discharge, kinetic energy less the kinetic energy of forward speed $\frac{Vj^2}{2g} - \frac{V^2}{2g}$ where Vj is jet velocity, and V is aircraft velocity, both expressed in feet per second.

Here Air Comdre. Banks mentioned the need further to improve the fuel consumption of the simple jet engine and discussed the merits and properties of axial and centrifugal compressors.

Compounding, i.e., using compressors in series, will probably be necessary at the high-pressure ratios in order to obtain the maximum degree of flexibility and to avoid stalling at low rotational speeds. It is very necessary to obtain as high an

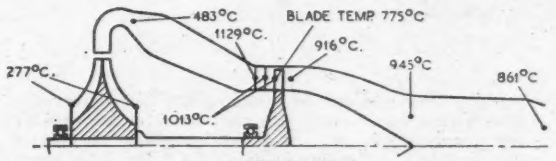

Fig. 14. Variation of temperature in a Whittle-type unit.

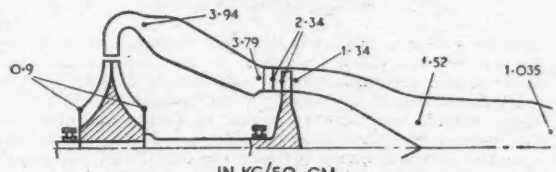

Fig. 15. Variation of pressure in a Whittle-type unit. (1 kg/sq cm = 14.22 lb/sq in.)

POWER UNITS FOR FUTURE AIRCRAFT

adiabatic efficiency as possible, otherwise the power required to drive the compressor will increase disproportionately.

In small short-range aircraft of the high-speed pursuit type, the length of the axial may be almost more embarrassing than the somewhat larger diameter, but shorter, centrifugal compressor. Because, if the engine is placed in the fuselage, its diameter may matter little but its length may seriously prejudice the arrangement of guns and fuel tanks. The air intakes of the engine, which are of paramount importance, must not suffer loss in efficiency, even for the gun installation.

On the question of separate (multi) versus annular combustion chambers; practically all British engines use the former type of combustion system. The advantages are that it is a relatively simple matter to test one unit (chamber) and know that it is representative of those eventually to be fitted to the engine; also, it only takes a fraction of the total equivalent engine air to test.

In order to design compact and light turbine engines, it is necessary to obtain the largest output of work per stage of both the compressor and the turbine. It is also necessary to have the highest flow rates possible, in order to obtain an engine of minimum total cross-sectional area. To achieve

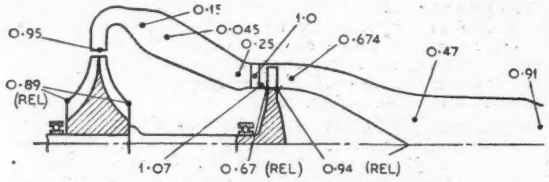

Fig. 16. Variation of Mach number in a Whittle-type unit.

this, high flow velocities through the components are required, extending well into the compressibility region. In addition, high blade speeds are desirable, but this obviously leads to high stresses. Consequently, the design, as in all mechanical engineering, must be a compromise; which, in this case, is one between the stressing of the turbine and its blading and the maximum flow velocities or Mach numbers which can be obtained without any appreciable loss in efficiency.

When referring to stresses, it is the British practice also to specify a value for the gyroscopic loading which must be allowed for in the design of the turbine, to meet the aircraft manœuvring conditions. This figure is 3.5 radians per second.

The gas turbine is a "full-throttle" engine and normally runs at or near maximum conditions. It has, therefore, the characteristics of such engines and the power falls off from sea level to altitude. The turbine is also critical to air-inlet temperature and it is very important to ensure that, when

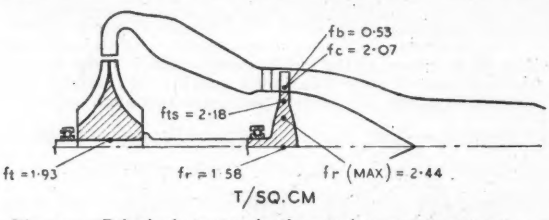

Fig. 17. Principal stresses in the moving components of a Whittle-type unit. ft = tangential stress at the impeller bore (12.28 tons/sq in). fr = radial stress in the turbine disc (fr max = 15.49 tons/sq in.) fts = the radial stress in the disc rim between blade root fittings. fb = the gas bending stress on the blades (3.39 tons/sq in). fc = the centrifugal stress on blades.

meeting a new aircraft requirement, allowance is made for the take-off and climb conditions in hot climates and also, under similar conditions, from high-altitude airfields.

There will be, in the future, a real problem in the supply of gas turbine fuels; both in regard to quality and quantity. The present fuel used is a kerosene, which has a paraffinic base and a boiling range between 150 deg C and 300 deg C. The freezing point is in the region of −40 deg C.

Gas oil is another promising fuel which should burn satisfactorily, but a combustion system must be developed to use

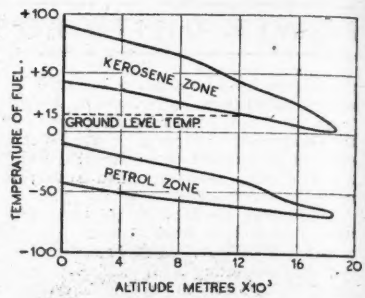

Fig. 18. The effect of altitude and temperature on the explosive limits of petrol/air and kerosene/air mixtures (1,000 M. = 3,280ft.)

it. A serious disadvantage of the normal gas oil is its high freezing point of 0 deg C to about −10 deg C, according to its constitution and refining.

The most easily obtainable fuel in quantity and one which should be very satisfactory in regard to combustion and also freezing point (about −70 deg C and lower) is ordinary low-octane motor fuel (gasoline), preferably of paraffinic base and without tetra-ethyl lead. Fuels of higher specific gravity, such as kerosene and gas oil, give about 8 to 10 per cent improvement in volumetric fuel consumption, relative to gasoline.

There has been considerable difficulty in maintaining stable combustion conditions at altitudes around 35,000 to 40,000 feet, and the flame has extinguished itself at about these altitudes (rich mixture blow-out). There has also been failure to relight after stopping the engine. The real cause, or causes, are obscure at the moment, but, in my opinion, it is mainly due to ineffective distribution of the fuel in the available oxygen (air) and the difficulty of initiating combustion in over-rich zones of mixture and at extremely low barometric pressures (200 mm Hg). I think, personally, the vapour pressure and/or the volatility of the fuel will be found to have considerable influence on this phenomenon.

Air Comdre. Banks here mentioned the risks of an explosive mixture forming in the space above the fuel in a tank containing kerosene.

Fig. 18 illustrates, graphically, the explosive ranges of petrol and kerosene, when related to temperature (in the tank) and altitude.

Rate of Pitch Change

The airscrew/turbine may present some difficulty in damping out the airscrew noise because, unlike the piston engine, the turbine will cruise near to its maximum revolutions and the airscrew tip speed may therefore be too high for passenger comfort; unless the airscrew can be designed to give a tip speed, at cruising conditions, of 650 feet/second (the accepted tip speed for reasonable noise level) and still retain a good propulsive efficiency.

It is estimated that the rate of pitch change, at constant-speeding conditions, for airscrews fitted to gas turbines should be about three times greater than the present rates for piston engines, i.e. from, approximately, 5 degrees per second to 15 degrees per second. The reason for this is, that the speed/power characteristics of a gas turbine are such that there is a very large increase in power over a narrow speed range as maximum speed is approached. Since airscrew turbines will cruise somewhere in the region of 90 per cent of maximum revolutions, close control is considered essential in order to cope with large power differences.

One final word on the subject of jet/turbines. It may be necessary to control the jet stream by means of "thrust spoilers," fitted in or at the end of the jet pipe, for naval deck landing aircraft and even for normal aerodrome use. This is particularly necessary in the case of axial-compressor engines, where it is not yet possible to reduce the idling speed to give a reasonably small value of thrust, because of the stalling characteristics of the axial at low revolutions. Therefore a "thrust spoiler" may have to be considered in order to avoid trouble at the moment of landing, to avoid taxying difficulties and to reduce the load on the wheel brakes.

In the case of very high-speed aircraft and those fitted with jet/turbines, the bi-fuel rocket and the propulsive duct or ram jet must not be forgotten. But these will mainly concern military aircraft. They will be valuable and will eventually be used as assisters, particularly for supersonic flight.

In conclusion, Air Comdre. Banks acknowledged the help and technical advice of Dr. Hawthorne and Mr. Moyes, and thanked Sqn. Ldr. Golovine for his useful criticism and the original translation of the paper into French.

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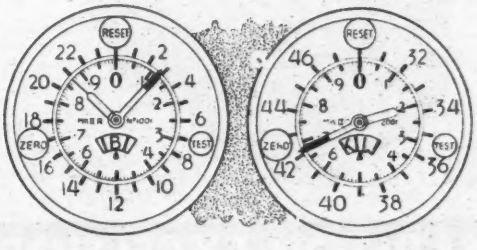

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The Civil Aviation Bill

Details of "Spheres of Influence" of New Corporations

SINCE the Civil Aviation Bill, which is now being presented to Parliament, is merely an expansion and completion of the Government's civil aviation policy which was outlined in the White Paper issued in December last year, it would be unkind to afflict the reader with a mere reiteration of policy. Nevertheless, there are a number of detail points which somewhat modify the appearance of the Government policy as this was originally outlined.

In the White Paper (outlined in *Flight* of December 27) the Government announced its intention of developing the country's air transport services by means of a trio of Corporations under national ownership and control. In the Government's view this will offer the best prospects for economic and efficient expansion and for orderly development in the wider international sphere. In addition to the existing British Overseas Airways Corporation, two new Corporations are to be formed.

In the words of the Bill, the three Corporations are to provide air transport services and to do other forms of aerial work in any part of the world, and to have the power to do whatever is necessary for the successful completion of these functions. They are also to have the power to acquire or to promote other air transport undertakings, and to hold stocks, shares, and financial interest in such undertakings.

The Corporations are to have the power, with the consent of the Treasury, to borrow money and to issue stock for the provision of normal working capital, for the promotion or acquisition of other undertakings, and for the redemption of other stock. The Treasury may guarantee any stock issued by, and loans made to, the Corporations. Limits are, however, to be imposed on their borrowing powers. The aggregate for British European Airways will not exceed £20 millions, for British South American Airways £10 millions, and for British Overseas Airways £50 millions.

In order to deal with any operating losses incurred, in particular during early years, the Minister may, with Treasury consent, make annual grants to the Corporations. These grants will also be limited in amount and will be authorized annually until March 31, 1956. For the period ending March 31, 1948, the maximum will be £10 millions annually, and for the subsequent years £8 millions. After this same date of 1947, the basis employed for deciding the amount of the grants will be that of the operating-cost estimates for the succeeding year. Each Corporation will be required to establish a reserve fund which will be managed and applied as directed by the Minister, who will also determine, in consultation with the chairman concerned, the details of the application of any "profits."

MONOPOLY

. . . it shall not be lawful for any person other than the three corporations, their associates, and servants, . . . to carry passengers or goods . . . upon any scheduled journey.

Each Corporation will submit annually an audited statement of its accounts to the Minister, and will supply an annual report of its operations with, in addition, such periodic returns and information as may be required.

Joint "consultative machinery" will be set up by the Corporations, in co-operation with their employees' representatives, to deal with the terms of employment, safety, health and welfare of the staff, and to discuss any other matters of mutual interest. Pension funds and other benefits or schemes for the employees are to be established according to regulations laid down by the Minister.

Although the Bill explains that Corporations and their associates are to have the exclusive privilege of air transport operations on scheduled services to, from and within the United Kingdom, charter and similar irregularly operated services may still be handled by private enterprise. The exact definition of such services is obviously very difficult to define, and it might be as well to quote, *verbatim*, the wording of the Bill at this point:—

Reservation of certain air services to the three corporations and their associates

23.—(1) Subject to the provisions of this section, it shall not be lawful for any person, other than the three corporations, their associates, and the servants and agents of the three corporations and their associates, to carry passengers or goods by air for hire or award upon any scheduled journey between two places at least one of which is in the United Kingdom.

CORPORATIONS' CAPITAL

British Overseas Airways £50,000,000
British European Airways £20,000,000
British South American Airways £10,000,000

(2) In this section the expression "scheduled journey" means one of a series of journeys which are undertaken between the same two places and which together amount to a systematic service operated in such a manner that the benefits thereof are available to members of the public from time to time seeking to take advantage of it.

(3) Nothing in this section shall restrict the right of any person—(a) to carry passengers for the sole purpose of instructing them in flying or the duties of aircrews; or (b) to carry passengers or goods for the sole purpose of providing an air ambulance or rescue service.

(4) Nothing in this section shall restrict the right of any person, for the purposes of any air transport undertaking of which the principal place of business is in any country outside the United Kingdom, to provide transport for passengers or goods in accordance with the terms of any agreement for the time being in force between His Majesty's Government in the United Kingdom and the Government of that country.

(5) A person who carries a passenger, or carries any goods, in contravention of the provisions of this section shall be liable in respect of each offence—(a) on summary conviction thereof, to a fine not exceeding three months, or to both such fine and such imprisonment; and (b) on conviction thereof on indictment, to a fine not exceeding five thousand pounds, or to imprisonment for a term not exceeding two years, or to both such fine and such imprisonment.

Although the Corporations may themselves engage in charter flying, they will not enjoy exclusive rights for these activities. Nevertheless, the permitted scope of private enterprise will obviously depend very much on the meaning of the term "scheduled service."

Such matters as airline facilities and, to an extent, fare consideration, will be dealt with by an Air Transport Advisory Council for the establishment of which the Bill provides. The Council will report to, and make recommendations to the Minister. The Council will not, however, have power to make final decisions.

The Minister will have power to acquire airdromes and any other land areas required for air transport purposes, either compulsorily or by agreement. In order to meet the needs of international air travel standards the Government will, in fact, nationalize all "air transport airdromes." He may also propose restrictions on the use of private airfields if such use is likely to endanger aircraft.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

AIRPORT ARGUMENT

Hurn Handier than Prestwick

MY interest was aroused by Mr. Soutter's letter (*Flight*, March 28th), regarding "the various advantages of Prestwick over Heathrow." It has always seemed pointless to me to regard Prestwick as an alternative to Heathrow, or London Airport as it is now called, when Hurn, which has a weather record as good as that of Prestwick, is so much nearer London.

Paris might as well be considered as the alternative to London as Prestwick, and probably many pilots, arriving from Paris and finding London fogged-up, would return to Paris rather than proceed to Prestwick!

Surely, it would be better to regard Prestwick as the airport for Scotland, and get on with operating services from it regardless of whether or not it is a good substitute for somewhere else.

C. FRANCKSEN.

A N.A.A. MUSEUM

Suggested Use for Obsolete Carrier

I HAVE been wanting for some time to raise a point in your correspondence columns with regard to the setting up of a Naval Air Arm museum. Of all the aircraft carriers that we started off with in this war, it is strange that the two oldest, namely, the *Furious* and *Argus*, survived. It is to be presumed that, with the end of the war and the cutting down in carrier strength these two veterans will be scrapped. I should like to suggest, through your columns, that one of these should be saved by the Government and converted into a Museum of British Naval Aviation.

Both these old-stagers have a distinguished war record and there can be very few of the older F.A.A. pilots who have not served in, or at least landed on, one of them. I am sure that Messrs Blackburn, who have been very active with regard to museum pieces in your advertisements, and Messrs. Faireys would be most willing to provide some of the older models, and there should be sufficient room in the hangars of, at any rate, the *Furious* for all this war's full-size machines. The "museum" could be docked at one of the naval ports or anchored in the Thames (?), and a small charge made to cover upkeep. Incidentally, the engine room of the *Argus* would probably provide considerable interest for marine engineers.

"NOSTALGIC."

ETERNAL TRIANGLE

Public Impatience is Justified

AFTER reading the article by "Commentator" in *Flight*, March 28th, I should like to make the following points.

First, people are not unjustified in being hopelessly impatient. The Government's inspiring policy of irresolution, bound up in a veil of secrecy, when viewed side by side with the spectacle of our rivals, as it were, with the ball well at their feet and none of our team within miles, is highly conducive to hopeless and even despairing impatience.

Secondly, if he really thinks that by the time the Government release full-scale plans for London Airport and the *final* scheme for Scottish aviation there will be any opportunity for criticism to take effect, he is doomed to sore disappointment.

Finally, if I may add my bit to the controversy on terminal airports, I would say that I consider the site for the international terminal should be chosen:

(*a*) For good visibility and safety conditions,

(*b*) for economy in cost of land and construction and

(*c*) for a position as near the centre of England as is compatible with the other two conditions.

Under these conditions every air traffic destination could be served by a smaller airfield on the expensive land close to it both for internal and for international traffic. We have ideal aircraft, I believe, for both these purposes, in the Bristol products Freighter and Wayfarer, which promise to be available soon

Also, as it is possible that aircraft may soon cease to need the present excessive lengths of runway, perhaps it would be as well not to use valuable land for projects of this character. Surely the Government could try to show some aptitude for the emulation of the economy and adaptability of private enterprise.

B. E. J. GARMESON.

INTERNATIONAL AGREEMENTS

Are Screw Threads to be Standardized?

IN this era of international agreements on air matters, is anything being done about the little detail of screw threads? There was a hint some months ago of a move towards a common standard, but no more seems to have been heard of it. Memories of exasperating hunts for "Yankee" nuts and unions when servicing American aircraft in the R.A.F. suggest that such a reform would be worth while in the long run. Admittedly it would be a big job, but the opportunity seems to be now—before civil flying gets into full swing—or never.

EX-CORPORAL.

ON BEING C.G.-CONSCIOUS

Members of Transport Command Know Their Job

I AM surprised to see that, as yet, no indignant member of R.A.F. Transport Command has written to correct the implication contained in Mr. John Howard's letter (*Flight*, March 7th) that R.A.F. transport aircraft are loaded haphazardly, with no consideration for weight distribution.

Mr. Howard has painted a picture of well-meaning erks stuffing aircraft with freight until they will hold no more, but visits to Transport Command bases have convinced me that nothing could be further from the truth.

Detailed forms, concerning the maximum amount of payload possible, and disposition of passengers and freight, must be completed before an aircraft takes off, and should the pilot be dissatisfied with the loading arrangements, he may refuse to fly the machine. The greatest regard for safety is paid by all concerned with the loading of transport aircraft, and the importance of being "C.G.-conscious" is certainly appreciated.

It is revealing to note that in the case of at least one Transport Command formation, even the W.A.A.F. booking-clerks were shown round the aircraft, and the C.G. pointed out and explained, so that they should appreciate the fact that density, as well as weight, is an important factor in loading aircraft.

ONLOOKER.

INCOMPARABLE TRAITS

An Odious Suggestion for "Indicator's" Pen

I WONDER if "Indicator" could be prevailed upon to compare and discuss two very well-known aircraft—the Beaufighter and Mosquito?

Questions I would very much like him to answer would be: Why was it so difficult, when landing a Beaufighter, to judge where your landing wheels were? Was it because you had so little in front of you by which to judge the attitude of the machine? The Mosquito had not got much in front of it, but it always seemed a perfectly easy machine to land.

The Beaufighter was rather ugly to look at, and the Mosquito was the sleekest thing imaginable, yet, with undercarriage and flaps down, the Beaufighter was perfectly manageable and gave no cause for anxiety, while the Mosquito, similarly situated, had only one real ambition—that of landing as soon as it could. Was the extra power in the Hercules solely responsible for this? I do not know the Merlin Beaufighter well enough to compare it with a Mosquito.

Would it be a fair comparison, in a general way, to compare a Beaufighter with a Hurricane and a Mosquito with a Spitfire? Their cruising speeds roughly tallied, and a Beaufighter had the sturdy appearance of a Hurricane, whereas both the Mosquito and Spitfire had a lady-like appearance.

I have read "Indicator's" articles on various machines with great interest.

A. T. A.

["Indicator" says: "Handling characteristics are the outcome of so many aerodynamic features that it is almost impossible to give detailed explanations of whys and wherefores. Comparisons are, in any case, sufficiently odious—and doubly so when the subjects are incomparable by any ordinary standards. 'A. T. A.,' however, might remember that there is a difference of about 30 m.p.h. in the stalling speeds of the two types, and the *relative* difference was not normally maintained in their respective approach speeds. Apart from difference of characteristics in approach conditions, the Mosquito is brought in at a speed which, from the aerodynamic point of view, is much 'nearer the edge.' Finally, aircraft characteristics unhappily vary with the pilots concerned! The Beaufighter was dealt with on September 20th, 1945, and Mosquito impressions will appear in due course."]

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The Dowty Undercarriage and Tailwheel on the Bristol Freighter incorporate Dowty Liquid Springs which require neither inflation nor maintenance

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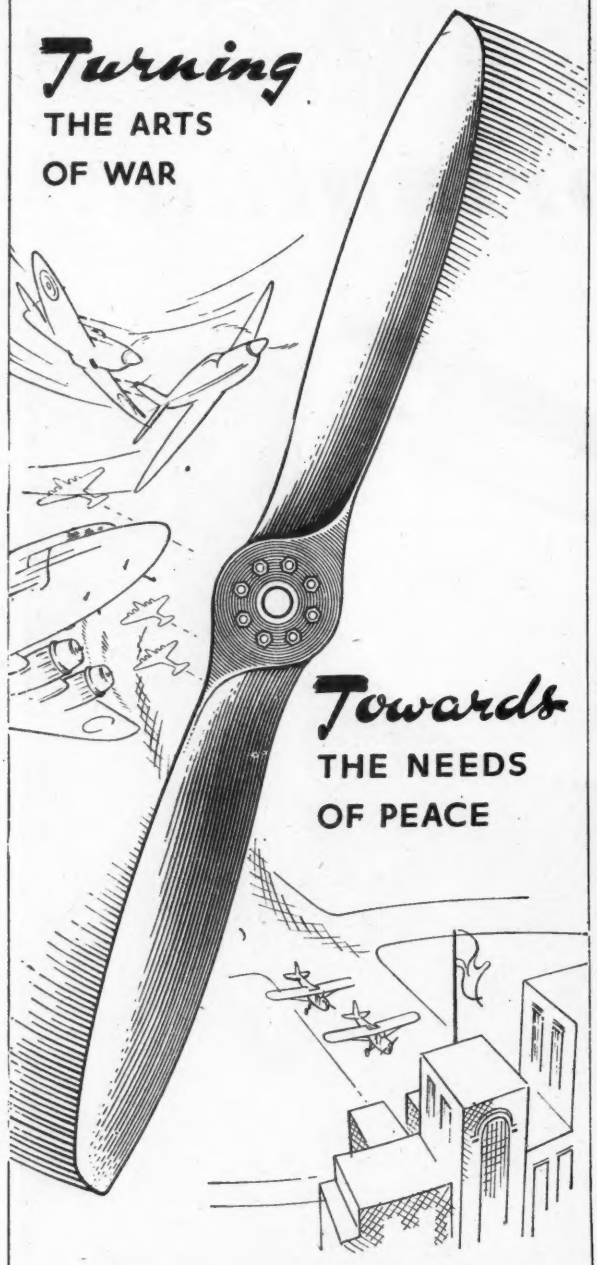

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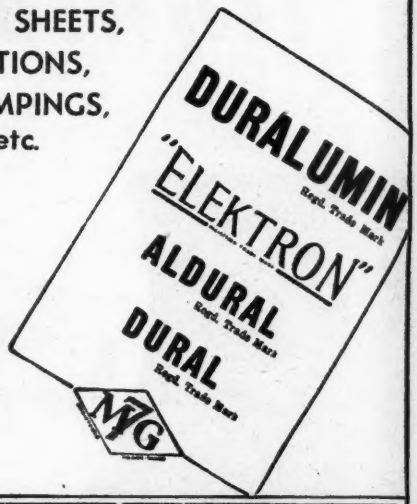

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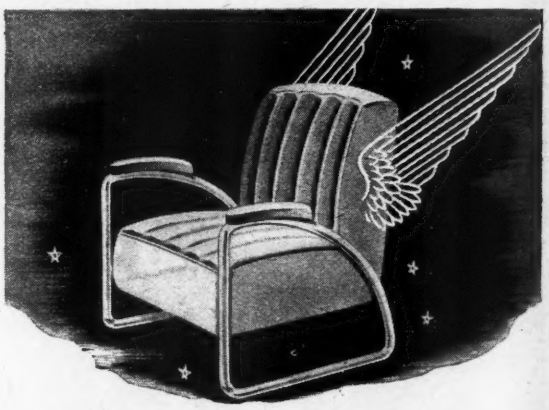

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THE INDUSTRY

Marflex Fuel Tanks

British Wartime Development Applied to Civil Aircraft

JUST as people are commonly guilty of using such proprietary names as Thermos, Primus and Cellophane, when referring to each and every vacuum flask, pressure-fed spirit stove, and transparent wrapping paper respectively, so there has sprung up a tendency to call every flexible fuel tank a Mareng tank for much the same reason—that the Glenn Martin flexible fuel tank of this name was the first of its kind.

In point of fact, flexible fuel tanks, fitted to British aircraft since 1941, are the fruits of research and development in self-sealing tanks begun by I.C.I. in 1939, when this British organization was asked by M.A.P. to look into the problem of bullet-proofing the normal metal fuel tank on operational aircraft. And it was while this problem was being tackled that I.C.I. were informed of the Mareng cell developed by the Glenn Martin concern in America, and acquired the sole manufacturing rights of this invention for Great Britain and other countries.

Thus, in 1940, the I.C.I. Marston Excelsior factory at Wolverhampton began experiments with flexible fuel tanks made of Neoprene-coated fabric tailored on wooden jigs, and the following year began production of the "Marflex" fuel cell.

The first aircraft to be equipped with Marflex tanks were the Mark VII and VIII Spitfires, and although a number of aircraft manufacturers, reared on metal tanks as it were, did not at first look on the innovation with very great enthusiasm (possibly because they feared it might affect the design of aircraft structure) the excellent results obtained by the first operational types to use the new type of fuel tank could not be disputed. Before very long Marflex fuel cells were being specified for more and more front line aircraft.

IT COULD TAKE IT: A Marflex fuel cell for a Miles Master was dropped (full) from a height of 30ft. on to sandbags. It withstood the impact which bent the tubular steel mounting as shown.

It is not possible, here, to trace the various stages of development in detail, but improvements were of course going on all the time and various problems which arose as the result of operational experience were tackled and overcome by the appropriate technical departments of I.C.I. To-day, the tank material used for all types of Marflex fuel cells consists of a sandwich having an intermass and facing of Formvar-Glyceryl-Adipate synthetic resin calendered on to two-ply cotton fabric. The resin is impermeable to petrol and remains flexible over a comparatively wide temperature range. Bullet-proofing against small arms ammunition consists of two layers of woven felt with a layer of 3½ mm cellular rubber sandwiched between, and there is an outer covering of glass cloth giving anti-smoulder properties as an additional safeguard against fire. Cold-curing adhesives are used to stick all these layers together. Total thickness of the tank wall is ⅜in and the weight 1¼ lb/sq ft.

Nowadays, of course, the accent is on the application of the flexible fuel cell to civil aircraft, and, as an example, the Marflex crash-proof tanks for such types as the Tudor II and Bristol 167 (Brabazon I) weigh only 13 oz/sq ft, since there is no need for the bullet-proof interlayers of sponge rubber. An even lighter tank with a ⅛in wall is now available for light aircraft. These civil Marflex cells, incidentally, effect a useful saving in weight over a metal tank besides their obvious appeal from the safety aspect. The "Brabazon" installation consists of 13 cells for each wing giving a total capacity of 14,000 gal, while the Tudor is fitted with four cells in each wing and has a total capacity of 3,390 gal.

NEW B.T.H. DIRECTORS

MR. H. JACK, chief electrical engineer, Mr. A. A. Pollock, chief mechanical engineer, and Mr. L. J. Davies, head of the research laboratory, have been elected directors of the British Thomson-Houston Co., Ltd.

Mr. Martin Sharp, the energetic P.R.O. of de Havilland's who expects to visit America shortly.

MILES EXPORTS

MILES AIRCRAFT, LTD., have recently delivered twelve Magister trainers to the Eire Army Air Corps, and an order for ten machines of the same type has been received from Portugal.

Both of these countries use Miles Masters for advanced training, and Martinets for target-towing practice.

BACK TO CIERVAS

AFTER commanding the only rotating-wing flight of the R.A.F. during the greater part of the war, Sqn. Ldr. H. A. Marsh has now been demobilized and has returned to his old firm, the Cierva Autogiro Co., Ltd., at the Airport, Southampton, as manager and test pilot. His work on the development-testing of the jump-start Autogiro, among other things, will still be remembered.

BENDIX-GIRLING MERGER

THE well-known brake manufacturing firms of Bendix and Girling have now amalgamated and are operating as Girling, Ltd.

The manufacture of Bendix aircraft braking equipment is, of course, being continued by the new company and is being carried out at their new factory at Cwmbran, nr. Newport, South Wales. A number of contracts for post-war aircraft have already been commenced.

The administrative headquarters of Girling, Ltd., are now centred at the former Bendix factory, Kings Road, Tyseley, Birmingham, 11.

NEW RESEARCH HEAD

MR. E. A. G. LIDDIARD, M.A., has resigned his position of Research Manager of the British Non-Ferrous Research Association to take up his appointment as Director of the Fulmer Research Institute, founded by Col. W. C. Devereux, F.R.Ae.S.

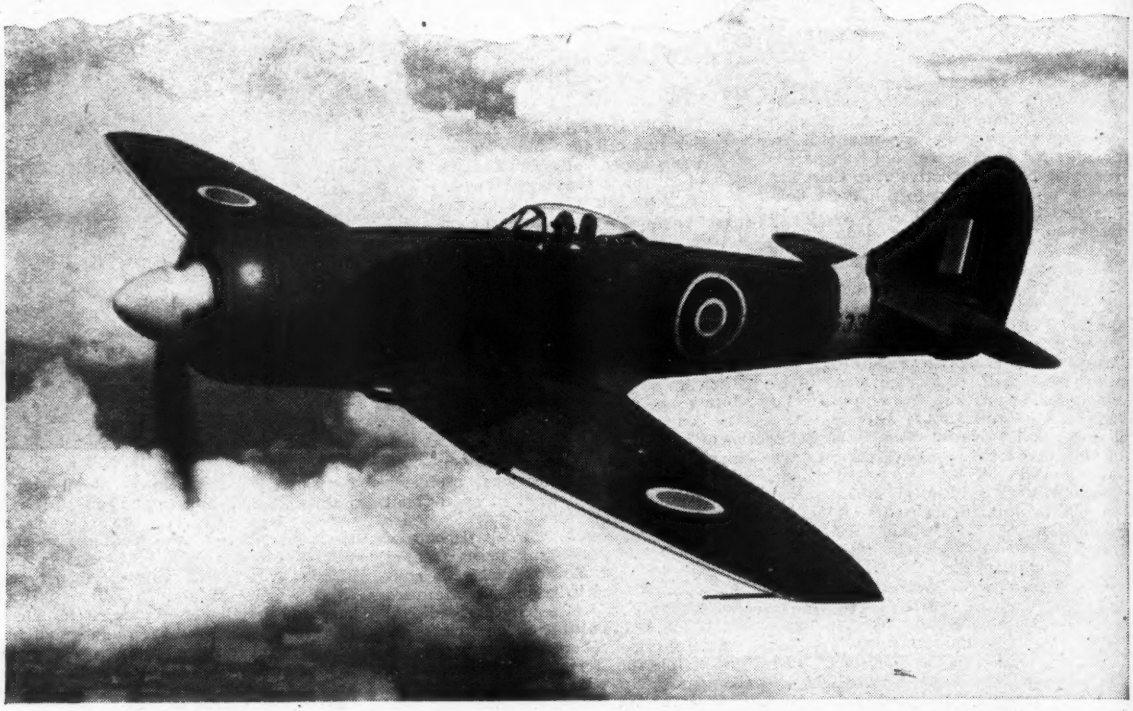
"FREIGHTER" AIR SYSTEM

HEYWOOD "Hymatic" Compressed Air Equipment has been adopted as standard for brake operation on the Bristol "Freighter."

Extensive experience gained during the war has resulted in improved versions of the compressor being available for civil aircraft.

The Hymatic system as fitted on the Bristol "Freighter" includes the compressor, an oil and water separator and automatic regulator operating from each gear box to a single reservoir, at a working pressure of 450 lb/sq in and provides the pneumatic supply for braking.

SERVICE AVIATION



A new study of the Hawker Tempest II showing its smooth lines to their best advantage.

Royal Air Force and Naval Air Arm News and Announcements

R.A.F. Reunions

No. 615 (County of Surrey) Squadron, A.A.F.

ALL A.A.F., R.A.F. and R.A.F.V.R. personnel associated with the Squadron who wish to attend a reunion dinner this spring (date to be notified), please send full personal particulars and address to Wing Cdr. Walter Stern, "Ormonde," Ashwood Road, Woking, Surrey.

Old Cranwellian Association

THE annual reunion of members of the Old Cranwellian Association will be held in the Royal Air Force College on Saturday, June 15th, 1946.

Members are requested to communicate with the Hon. Secretary at S.H.Q. Cranwell after May 1st for details.

Awards

Royal Air Force

THE KING has been graciously pleased to approve the following awards in recognition of gallantry and devotion to duty in the execution of air operations.

Distinguished Service Order

Act. Sqn. Ldr. L. F. EVANS, A.F.C., R.A.F.V.R., No. 356 Sqn.—Since joining this squadron in May, 1944, Sqn. Ldr. Evans has completed a large number of sorties, mostly against heavily defended targets, including Rangoon, Bangkok and Moulmein. In July, 1944, he took part in an attack against the railhead at Ye-U. He has led the squadron on a number of daylight operations and has acted as deputy leader on numerous occasions, always with great skill and success. In May, 1945, this officer was detailed to take part in an attack against Port Blair. Despite severe opposition, Sqn. Ldr. Evans pressed home his attack with determination. In June, 1945, he took part in an operation against Japanese troop concentrations near Alugale. Owing to extremely bad weather, only four aircraft, of which this officer's was one, reached and bombed the target. He also took part in an extremely successful attack against the Kanchanaburi railway bridge. When the squadron arrived at the Cocos Islands, in the absence of the squadron commander, Sqn. Ldr. Evans took over the command of the squadron, a task he accomplished with distinction and ability. This officer has always shown leadership, skill and devotion to duty of a very high standard.

Bar to Distinguished Flying Cross

Flt. Lt. N. C. BERRISFORD, D.F.C., R.A.F.V.R., No. 139 Sqn.

Distinguished Flying Cross

Act. Sqn. Ldr. J. L. POWELL, R.A.F.V.R., No. 617 Sqn.

Flt. Lt. J. M. AYSHFORD, R.A.F.V.R., No. 240 Sqn.

Flt. Lt. D. M. PIERI, R.C.A.F., No. 412 (R.C.A.F.) Sqn.

F/O. R. C. RIDGE, R.C.A.F., No. 404 (R.C.A.F.) Sqn.

Conspicuous Gallantry Medal (Flying)

Sgt. (now W/O.) P. A. HILTON, R.A.F.V.R., No. 35 Sqn.

Distinguished Flying Medal

Sgt. (now W/O.) H. LE Q. MOURANT, R.A.F., No. 10. Sqn.

Military Medal

L.A/C. C. J. FONES, R.A.F.V.R., No. 662 A.O.P. Sqn.

Flt. Sgt. (now P/O.) H. BESLEY, R.A.A.F.

Foreign Decorations

THE KING has granted unrestricted permission for the wearing of the undermentioned decorations conferred upon the personnel indicated in recognition of valuable services rendered in connection with the war :—

Conferred by the President of the National Government of the Republic of China

Cloud and Banner Decoration with Special Cravat

Air Vice-Marshal W. F. MACNEECE FOSTER, C.B., C.B.E., D.S.O., D.F.C., R.A.F.

Act. Flt. Lt. A. F. MURLEY, M.B.E., R.A.F.V.R.

Cloud and Banner Decoration with Special Badge and Knot

Group Capt. E. L. S. WARD, D.F.C., R.A.F.

Wing Cdr. G. T. B. CLAYTON, D.F.C., R.A.F.

Act. Wing Cdr. A. G. PARNALL, R.A.F.V.R.

Act. Wing Cdr. R. E. G. VAN DER KISTE, D.S.O., R.A.F.

Cloud and Banner Decoration with Knot

Act. Flt. Lt. P. A. LONG, R.A.F.V.R.

Conferred by the President of the Czechoslovak Republic

Order of the White Lion, First Class

Air Marshal Sir RODERIC M. HILL, K.C.B., M.C., A.F.C., R.A.F.

Second Class

Air Vice-Marshal Sir BRIAN E. BAKER, K.B.E., C.B., D.S.O., M.C., A.F.C., R.A.F.

Fourth Class

Act. Wing Cdr. S. R. K. GLANVILLE, M.B.E., R.A.F.V.R.

Military Cross (1939)

Act. Group Capt. A. G. MALAN, D.S.O., D.F.C., R.A.F.

Military Medal, First Class

Sqn. Ldr. C. P. SHEPPARD, R.A.F.V.R.

Flt. Lt. G. D. BLACKWOOD, R.A.F.V.R.

Second Class

Sgt. A. J. BREWSTER, R.A.F.V.R.

Conferred by His Majesty the King of the Hellenes

Order of George 1st, Commander

Act. Group Capt. P. R. FOLEY, O.B.E., A.A.F.

Order of Phœnix, Grand Officer

Air Comdre. G. W. TUTTLE, C.B., O.B.E., D.F.C., R.A.F.

Air Force Cross

Act Group Capt. M. G. F. PEDLEY, D.S.O., D.F.C., R.A.F.

Roll of Honour

Casualty Communiqué No. 568.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of the names in this list 244 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Flt. Sgt. J. Briggs; L.A/C. R. H. G. Chapple; Sgt. A. E. Crosby; Flt. Sgt. J. Gordon; P/O. C. Greenslade; Flt. Sgt. R. S. Neate; W/O. R. Newsome; Flt. Sgt. E. T. Smith; F/O. H. J. Van der Pol; W/O. W. H. Walton.

MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Lt. C. G. F. Deck; Flt. Sgt. D. S. B. Derrett; Flt. Sgt. G. B. Johnson; Wing Cdr. H. Law-Wright, D.S.O., D.F.C.; F/O. J. C. B. Rae; Flt. Sgt. T. McK. Stonham.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. E. P. Bates; Act. F/O. P. W. Reaks.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. R. D. Ackers; Sgt. S. Adair; Sgt. C. C. Addems; Sgt. C. Alexander; F/O. G. J. Allin; F/O. H. E. Allman; Sgt. A. Anderson; Flt. Sgt. A. W. Ashworth; F/O. H. T. G. Atkinson; P/O. J. E. Bailey; W/O. N. Baird; Flt. Sgt. D. A. Barnes; Sgt. S. S. Barnett; Flt. Sgt. G. W. Battersby; F/O. L. C. W. Boivin; Sgt. S. D. Bolton; P/O. G. Booth; Act. Flt. Lt. E. G. W. Bowers; Sgt. J. G. Bradford; Flt. Sgt. P. L. Brooker; Sgt. W. S. Bryson; Sgt. K. O. Butcher; Flt. Sgt. T. P. Byrne; Sgt. T. D. S. Cairns; Sgt. J. Carver; Sgt. D. A. Cato; F/O. S. A. Clack; Act. Sqn. Ldr. A. W. A. Compton; Sgt. C. W. Connolly; Sgt. W. Cooper; Sgt. K. P. Coote; F/O. P. J. Cowgill, D.F.C.; P/O. G. Curless; Sgt. A. J. Currin; W/O. J. F. Dell; Sgt. P. Devlin; Sgt. J. C. Doughty; F/O. A. Dow; Sgt. D. Emmott; Sgt. D. Englefield; Sgt. R. E. Eratt; Sgt. D. T. Evans; Flt. Sgt. E. E. Evans; Sgt. B. Farndale; P/O. J. E. Ford; P/O. A. E. Fox; F/O. W. E. Gibbs; Sgt. K. M. Goodman; Sgt. W. Goulding; F/O. J. F. J. Greig; Sgt. T. R. L. Griffiths; F/O. R. S. Hancox; Flt. Lt. K. J. Harries; Flt. Sgt. H. Harris; W/O. P. C. Haslam; P/O. E. Hatzfeld; F/O. J. O. Hawdon; Sgt. W. M. Hill; F/O. F. E. Hodgson; F/O. I. H. R. Hood; Sgt. J. Houghton; F/O. P. A. Hughes; F/O. P. A. C. Hunt; Act. F/O. R. V. Ings; Flt. Sgt. L. Irlam; Flt. Sgt. A. L. Jackson; P/O. F. E. James; F/O. M. James, D.F.C.; Flt. Sgt. R. H. Jenkins; Flt. Sgt. K. J. Jewell; W/O. R. Jones; Sgt. R. Jones; Sgt. D. T. Kennedy; Sgt. W. O. Kenyon; F/O. J. Kinman; P/O. D. S. Kirkland; Sgt. J. Knight; F/O. G. Lawrence; Sgt. G. V. Lea; Flt. Sgt. R. Lee; Sgt. P. J. Leighton; F/O. B. S. Leuty; Sgt. L. G. Lewis; P/O. H. Lupton; W/O. A. W. McGinnis; Sgt. W. D. Mackenzie; Sgt. R. McG. McLaren; F/O. A. G. Maclean; Sgt. L. Maiden; Flt. Sgt. A. J. Maton; Act. F/O. E. C. Maul; Flt. Sgt. I. G. C. Miller; Sgt. A. G. E. Mount; P/O. D. Murray; P/O. H. D. Murray; Flt. Sgt. L. E. Newman; Sgt. T. C. Newman; Flt. Sgt. T. L. Nixon; Sgt. W. F. Noble; P/O. G. B. Noonan; Sgt. D. G. Northcott; Sgt. R. E. S. Packham; F/O. J. Parker; Flt. Lt. T. G. J. Parker; F/O. M. F. Payne; Sgt. C. Pearson; Flt. Sgt. G. T. Phippen; Flt. Sgt. A. L. Plimmer, D.F.M.; Sgt. R. W. Pomroy; Sgt. R. Poole; Flt. Lt. W. R. Pow; F/O. A. J. Pritchard; Sgt. W. E. Pullen; Sgt. W. T. Quinlan; Sgt. E. C. Reid; Sgt. G. G. Remsbery; P/O. R. F. Rosemond; Act. F/O. H. Ross; Flt. Sgt. D. Rowell; Flt. Sgt. F. W. Russell; Sgt. J. C. Samuel; Sgt. A. J. Sayers; Sgt. P. A. Scratchley; Sgt. A. Seviour; Sgt. F. P. Sharpe; Sgt. J. K. Slack; Sgt. T. D. Smith; Sgt. T. R. Smith; Sgt. J. J. Starsmore; Sgt. W. J. Stephens; Sgt. N. Stevens; Sgt. J. R. Stone; Sgt. O. Tabuteau; Flt. Lt. D. B. Tattersall; P/O. R. Taylor; Flt. Sgt. P. J. Taylor; Act. Flt. Lt. E. I. Tennant; Sgt. F. Thackeray; Flt. Lt. R. H. Thomas; F/O. D. T. Tull, D.F.C.; Sgt. G. A. Vaughan; Flt. Sgt. I. C. Vaughan; F/O. E. Vierow; Sgt. W. N. Watson; P/O. I. G. Williams Flt. Sgt. A. E. Windle; Sgt. E. A. Wood; Sgt. R. Woodrow; Flt. Sgt. E. Young.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—W/O. D. J. McCrae.

MISSING.—F/O. R. J. Wilcock.

KILLED ON ACTIVE SERVICE.—F/O. A. K. Allan; Sgt. R. H. Avery; P/O. G. Barlow; F/O. T. Batley, D.F.C.; P/O. S. Buchanan; Sgt. C. E. Butler; Flt. Sgt. G. J. Clifton; Sgt. W. F. G. Edge; Flt. Sgt. J. E. Fivash; W/O. C. H. J. Forsyth; Sgt. A. J. Franklin; F/O. P. F. Gunter; L.A/C. F. Grady; Sgt. J. Grant; Flt. Lt. C. Grayson; Flt. Sgt. J. F. S. Green; Flt. Lt. F. L. Hargreaves; Flt. Sgt. E. Hastings; Sgt. N. Hooley; F/O. H. J. Hurst; Sgt. B. W. Kelly; Flt. Sgt. A. R. Kirschner; W/O. G. Lowcock; F/O. W. G. L. Mills; F/O. G. W. Morris; W/O. R. M. Morrison; Flt. Sgt. N. D. Rendle; Flt. Sgt. P. N. Scott; Flt. Lt. B. D. Spark; Sgt. A. C. Suggate; Flt. Sgt. R. J. Sullivan; P/O. M. E. P. Tardif; Flt. Lt. T. H. Topping; F/O. R. L. Walters; Sgt. W. G. Wareham; W/O. W. Wilkes; Flt. Sgt. N. Wilks; Sgt. S. Williams; F/O. O. Wlison-North.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—F/O. J. Doyne; Sgt. W. Gibson.

MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Act. Sgt. W. T. Keates.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. J. E. C. Buttle; Flt. Lt. F. E. S. Gardner; Flt. Sgt. J. A. Hitchcock; Flt. Sgt. E. W. Wright.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—F/O. J. F. Baird; Sgt. A. H. Brown; Sgt. J. Busk; P/O. L. Cowell; W/O. J. H. Diffley; Sgt. E. Dixon; Sgt. J. S. Ernest; Flt. Sgt. R. C. Fayers; F/O. D. A. Hemmings; Sgt. W. Kenny; P/O. D. C. F. McCrae; Sgt. J. E. Muldowney, D.F.M.; L.A/C. H. Stott; Sgt. J. N. Wheldon.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW REPORTED KILLED ON ACTIVE SERVICE.—A/C.1 R. W. Metherell.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Flt. Sgt. G. R. Brown; W/O. R. Elding; Flt. Lt. K. J. F. Grainger; Flt. Sgt. J. Heap; F/O. T. Ward; Flt. Sgt. G. A. Whittaker.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Flt. Sgt. D. F. Deans; W/O. E. H. Lee; Flt. Sgt. L. R. Mcintosh.

DIED ON ACTIVE SERVICE.—A/C.1 R. E. Ashard; L.A/C. R. Beagley; L.A/C. R. L. G. Black; L.A/C. K. E. A. Clark; A/C.2 H. Corey; Cpl. M. M. Couch; Cpl. J. Downs; Sgt. D. Dawson L.A/C. J. Dugdale; Cpl. C. W. Fletton; Sqn. Ldr. J. C. Foster; Sgt. T. J. Gay; L.A/C. A. Gravell; L.A/C. T. R. Guest; L.A/C. J. M. Hartnell; Act. Sqn. Ldr. J. Hills; L.A/C. G. E. Jackson; L.A/C. G. Kemp; F/O. H. B. Lloyd; L.A/C. W. R. McKinnon; L.A/C. T. W. Macleary; Sgt. K. E. Nuttall; L.A/C. G. E. Poolman; Cpl. T. R. Powell; L.A/C. T. J. Roberts; F/O. A. Smith; Flt. Lt. J. A. Smith, L.A/C. L. F. Smith; L.A/C. F. P. Stait; Cpl. S. R. Waters; Sgt. G. Wright.

PREVIOUSLY REPORTED MISSING, NOW REPORTED DIED ON ACTIVE SERVICE.—P/O. A. W. Benting.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—A/C.1 F. J. Watts.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. T. Adcock; F/O. J. L. Arnell; P/O. W. S. Baxter; Flt. Sgt. A. Bennett; P/O. R. A. W. Blair; Flt. Sgt. J. A. Boatswain; P/O. H. J. Carrington; F/O. T. K. Clarke; W/O. T. W. Coburn; P/O. A. E. Crellin; Flt. Sgt. C. E. Currie; F/O. J. M. Date. Flt. Sgt. G. F. Day; Flt. Sgt. C. K. Deed; F/O. L. L. Deed. D.F.C.; Act. Flt. Lt. S. L. Dennis, D.F.C.; Flt. Sgt. R. J. Dickie; Act. Flt. Lt. W. Dobson; F/O. D. W. Dunham; P/O. D. R. Fisher; Flt. Sgt. N. W. Gadsden; F/O. B. H. Gifford; W/O. R. D. Gilbert; Flt. Sgt. A. R. Giles; P/O. J. G. Gordon; Flt. Sgt. F. I. Griffin; Flt. Sgt. R. W. Hore; W/O. C. L. Hughes; Flt. Sgt. J. M. Hulmes; Flt. Sgt. A. S. Jackson; P/O. H. C. Jones; Flt. Sgt. G. J. K. Laidler; P/O. N. W. Leibhardt; F/O. E. T. Leslie; Act. Flt. Lt. J. N. McDonald, D.F.M.; F/O. H. H. McMullan; P/O. R. M. Marshall; Act. F/O. R. J. Mellowship; F/O. J. J. Minogue; F/O. H. P. Moylan; P/O. H. F. Munday; W/O. J. P. O'Meara; Flt. Sgt. T. A. Orr; Flt. Sgt. D. K. Powers; P/O. L. G. Pratt; F/O. G. P. Roberts; P/O. H. S. K. Ross; F/O. M. C. Short; Act. F/O. M. C. Skarratt; Flt. Sgt. T. H. Smith; Flt. Sgt. R. I. Stewart; W/O. G. J. Stokes; P/O. C. K. Thomas; P/O. J. A. Traill; Flt. Sgt. J. W. Van-Cootan; F/O. J. M. Ward; Flt. Sgt. A. G. Webber.

KILLED ON ACTIVE SERVICE.—Act. Flt. C. J. Merryfull.

R.A.F. WAR COMMANDERS

Air Marshal Sir Leslie Hollinghurst

AIR MARSHAL SIR LESLIE NORMAN HOLLINGHURST, K.B.E., C.B., D.F.C., has the reputation of being one of the R.A.F.'s outstanding organizers, and this no doubt influenced his recent appointment to what is one of the most onerous posts in the R.A.F., that of Air Member for Supply and Organization in the Air Council.

He was educated at Felsted. In 1914, he enlisted as a motor cycle despatch rider in the Royal Engineers, and in 1916 was commissioned in the Middlesex Regiment. In March, 1917, he transferred to the R.F.C., saw service in France, and in 1918 was awarded the D.F.C. for the destruction of four enemy aircraft and another driven down out of control.

After the war Sir Leslie served in India. In 1924, he completed a R.A.F. Staff College course, and three years later he was appointed to the staff of the G.O.C., Shanghai Defence Force. In India, in 1931, he was awarded an O.B.E. for operations on the North-west Frontier, and from 1932 commanded No. 20 Squadron for two years. He then returned to take up a post on the Directing Staff of the R.A.F. Staff College. In 1938 he passed through the Imperial Defence College and then joined A.M.S.O.'s department at Air Ministry as Deputy Director of Peace Organization. Later he became Director of Organization, and eventually Director-General of Organization with the rank of Air Vice-Marshal, receiving a C.B. in 1942. Thus he already has considerable experience of the departments which he now represents on the Air Council.

When "Holly," as he is familiarly known, left Air Ministry in July, 1943, he became A.O.C. 9 Group, but four months later was posted as A.O.C. 38 Group, where he did magnificent work in the building up of the airborne squadrons in preparation for the re-entry into Europe. The success of the British airborne operations on the Normandy bridgehead was due in no small measure to his efforts. He flew into France himself with the first party of his men on D-day. Sir Leslie was awarded a C.B.E. in 1944, and at the end of that year was posted as A.O.C. British Air Forces South-East Asia with the rank of Air Marshal.

In July, 1945, at the age of 50, he succeeded to the post of A.M.S.O., taking over from Air Chief Marshal Sir Christopher Courtney, at the same time receiving a knighthood.

SERVICE AVIATION

DIED ON ACTIVE SERVICE.—W/O. B. F. Butchart; Cpl. A. A. Clark.

Royal Canadian Air Force

KILLED IN ACTION.—F/O. W. C. Campbell; F/O W. J. Friesen; F/O. A. R. W. Harrison; Flt. Sgt. S. H. L. Smith.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. T. De Vries; F/O. C. G. Hutchings; W/O. J. G. Jacques; Flt. Sgt. J. O. Reeb.

MISSING.—F/O R H. S. M. Patterson.

KILLED ON ACTIVE SERVICE.—Flt. Lt. R. W. C. Davis; F/O. W. J Hanna.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Flt. Sgt. G. C. Moir.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. E. H. F. Atkinson; F/O J. A. Dale; F/O. J. A. Fleming; Act. F/O. D. F. Holder; Act. Flt. Lt. C. F. Jacobson; Flt. Lt. O. H. Oden; P/O. L. C. Perry; F/O. G. R. Trafford.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Flt. Lt. B. M. Madden;, F/O. I. C. Rodgerson; P/O. J. K. Stellin.

KILLED ON ACTIVE SERVICE.—Flt. Lt. R. J. Dall, D.F.C.

South African Air Force

DIED ON ACTIVE SERVICE.—Air Mech. H. D. Jacobs.

Casualty Communique No. 569

Of the names in this list 255 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—F/O W. O. Davison; F/O. H. T. Wigley, D.F.C.

MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—A/C.1 C Abel; W/O. G. M. Eason; W/O. D. J. Nicolson; Act. Sqn. Ldr. R. N. Rowson; Flt. Sgt. A. A. Shallow; F/O. B. B. Stansfield.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. J. A. C. Strange.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. E. R. Abell; Sgt. J. C Alexander; Sgt. J. Allison; F/O. D. W. Aston; Sgt. W. S. Ballinger; F/O. J. M. Beaton; Flt. Sgt. L. S. Bell; Flt. Sgt. R. Bensley; Flt. Lt. H. D. Binns; Flt Sgt. H. M. Bittiner; Sgt. W. P. Blake; Sgt. W. Bradley; Sgt. W. D. Brockett; P/O. J. F. Butson; Flt. Sgt. I. Campbell; Sgt. J. J. Carey; P/O J. D. Cassan; Sgt. J. P. Cassin; Flt. Sgt. E. L. Collins; Sgt. T. Collins; Sgt. J. C. Coverley; Sgt. T. H. Davis; Sgt. G. B. Donaldson; Flt. Lt. E. C. Duke, D.F.M.; Flt. Lt. F. R. Dunton; F/O. F. E. Eley; Flt. Sgt. A. F. C. Elwood; Flt. Sgt. E. F. Evans; Sgt. R. D. Faint; Sgt. T. Fergus; Flt. Sgt. T. W. Ferguson; Sgt. C. W. Fieldhouse; Flt. Lt. W. E. Frew, D.F.C.; F/O. D. F. Gay; Sgt. R G. Glanville; F/O. S. W. Greengrass; Sgt. C. C. Grego; Sgt. D. V. Guttridge; Sgt. A. J. Handford; Sgt. J. E. Harling; Sgt. F. G. Harris; Flt. Sgt. F. S. G. Heal; Sgt. E. R. Hearn; Flt. Sgt. A. V. Howarth; Flt. Lt. B. J. Hughes; Sgt. G. M. Jack; Flt. Sgt. K. J. Johnson; Act. F/O. H Jones; Sgt. H. C. Keatley; Sgt. R. D. Kempthorne; Flt. Sgt. A. G. Kilsby; Sgt. R. S. Lang; Wing Cdr. K. J. Lawson, D.S.O., D.F.C.; F/O. D. Laycock; Sgt. H. K. L'Estrange; Flt. Sgt. J. F. Lewis; Sgt. K. V. Logan; Sgt. G. S. Lowson; Sgt A. M. Macivor; Sgt. D. C. McLachlan; F/O. J. Maher; Flt. Sgt. F. N. Manton; Flt. Sgt. D. J. Mason; P/O. H. C. B. Merry; Sgt. C. R. Millward; Sgt. C. M. Murray; Sgt. D. J. Neale; Sgt. J. W. W. Overee; Sgt. E. E. R. Paterson; Flt. Sgt. F. Pearson; Act. Sqn. Ldr. A. S. Perkins, D.F.C.; P/O. V. J. E. Pink; F/O. N. L. St. G. Pleasance; Flt. Sgt. C. Rennie; F/O. F. Sayles, D.F.M.; Flt. Sgt. B. Smith; W/O. E. Smith; Flt. Sgt. L. G. Spear; Sgt. R. Stallwood; Sgt. G. R. Stott; F/O. N. J. Stronell; P/O. G. R. Thomas; Sgt. L. Thompson; Flt. Sgt. R. Towndrow; Sgt. J. A. Trayhorn; Flt. Sgt. N. Twell; Flt. Sgt. F. A. C. Varrall; Sgt. D. A. Webb; P/O. A. West; F/O. L. Whetton; Sgt. R. Whittle; Flt. Sgt. J. E. G. Whittome.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW REPORTED KILLED IN ACTION.—P/O. J. S. Ferguson; F/O. M. H. Sullivan.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Sgt. W. B. Bartholomew; F/O. H. S. W. Blaber; F/O N. Clarke; F/O. D. H. Fenner; Sgt. F. W. Fisher; Sgt. J. Fitzpatrick; W/O. E. E. Gray; Flt. Sgt. V. G. Hobbs; F/O. W. Kirkham; Flt. Lt. H. Lawson; Sgt. H. Lewis; Flt. Lt. W. M. Lightbourn; Act. Flt. Lt. J. G. Moore, D.F.M.; Flt. Sgt. G. A. R. Pritchard; Sgt. L. J. Sims; F/O. T. Sorenson; Sgt. R. E. Streatfield; Act. Wing Cdr. R. R. Thomson; F/O. K. W. Winder.

WOUNDED OR INJURED IN ACTION.—Sgt. M. A. G. R. Drummond; F/O. E. T. J. Manning.

MISSING, BELIEVED KILLED IN ACTION.—W/O. E. L. Holmes; F/O. H. L. O'Neill.

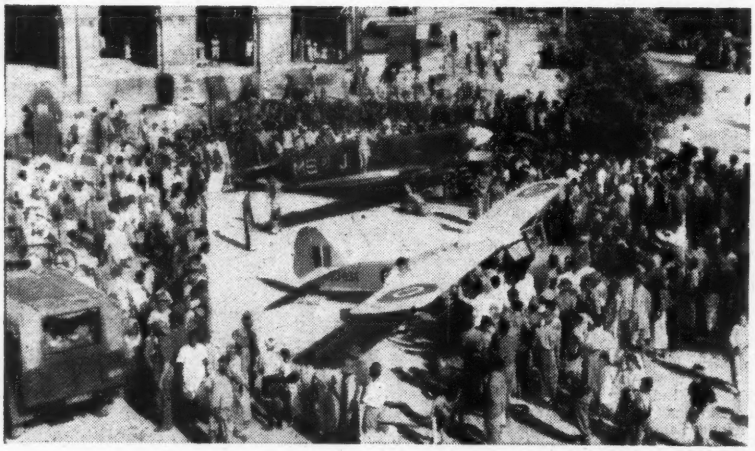
MISSING.—Flt. Lt. D. Cookson; Act. Sqn. Ldr. J. Rhind; F/O. A. Rhodes; Flt. Lt. J. Stenton.

KILLED ON ACTIVE SERVICE.—Sgt. P. J. Allsebrook; W/O. E. J. Aslett; F/O. C. H. Atkin; Flt. Sgt. S. P. Bell; F/O. J. L. Bendix; Flt. Sgt. L. G. Bennett; Sgt. D. J. W. Billinghurst; A/C.2 N. M. Black; Sgt. C. S. Cantrill; F/O. D. C. W. Churchill; Act. Flt. Lt. E. A. Clough; Sgt. P. W. Codd; Sgt. R. J. Derry; Flt. Sgt. J. Eastwood; A/C.2 R. Field, Flt Sgt. L. W. Garfield; Sgt. R. C. T. Goldthorpe; Sgt. C. W. Hawthorne; Cpl. H. R. Hunt; F/O. S. W. Ives; Flt. Lt. H. B. James; Cpl. W. R. Jones; Flt. Sgt. A. Joseph; L.A/C. E. Lowndes; Flt. Lt. P. R. D. Matthew; Flt. Sgt. A. J. Molyneux; F/O. M. J. Moulder; Flt. Sgt. D. S. Murray; Flt. Sgt. G. T. Parsons; Flt. Sgt. H. J. Plastow; Sgt W. E. T. Ringham; Sgt. J. W. Roberts; L.A/C. F. Robertshaw; W/O. R. H. Ryder; Flt. Lt. J. F. L. Sinclair; F/O. B. A. Smith; Sgt. S. Welsh; Flt. Sgt. L. P. Williamson; Sgt. R. J. Wilson; F/O. R. W. Wright.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW REPORTED KILLED ON ACTIVE SERVICE.—W/O. W. Wright.

WOUNDED OR INJURED ON ACTIVE SERVICE.—F/O. H. L. A. Clarke; Sgt. A. E. Driver; Flt. Sgt. T. Howe; Sgt. A. W. McMaster; F/O. A. Newham, D.F.C.; Flt. Lt. W. Teare.

DIED ON ACTIVE SERVICE.—A/C.1 S. F. Allcorn; L.A/C. S. Batchelor; W/O. J. Campbell; Cpl. J. B. Clark; L.A/C. C. E. Dennis; L.A/C. T. Dick; Cpl. C. A. Elston; L.A/C. K. M. Gilmour; Cpl. D. Y. Gourlay; Cpl. T. G. A. Jones; A/C.2 T. H. Kenny; A/C.1 J H. W. McDowell; L.A/C. W. T. Matthews; L.A/C. D. G. Morrison; L.A/C. L. A. Norman; L.A/C. O. R. Phillips; L.A/C. H. K. Scrase; F/O. D. N. Skey; L.A/C. A. W. H. Squire; L.A/C. O. C. Stephens; Wing Cdr. D. E. Ward; L.A/C. E. Williams; Act. Cpl. G. Wilson; F/O. T. E. B. Wilson; L.A/C. R. J. Worts; Sgt. F. M. Wrothwell.



R.A.F. EXHIBITION IN RANGOON: Last month Air Marshal Sir Hugh Saunders, A.O.C. R.A.F. in Burma, opened an exhibition of equipment and instruments in Rangoon. The picture above shows an interested crowd viewing a Spitfire and an Auster outside the Civic Hall, where the exhibition was held.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—L.A/CW. E. J. Aldridge; L.A/CW. E. Cunnington.

Royal Australian Air Force

KILLED IN ACTION.—W/O. T. W. Binning; P/O. J. R. Moore.

KILLED ON ACTIVE SERVICE.—P/O. C. E. Johnson; Flt. Sgt. K. B. Quinn; Flt. Sgt. R. J. Rogers.

Royal Canadian Air Force

KILLED IN ACTION.—W/O. R. H. Jones.

MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. L. F. Branston; F/O. G. A. O. Dauphinee; Flt. Sgt. W. H. Johnson; F/O. W. R. Vale.

MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Lt. G. H. Lawrence.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. A. G. Borland; F/O. G. E. Jones; Sgt. J. R. Milligan.

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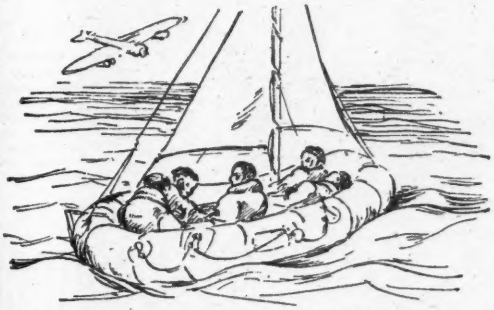

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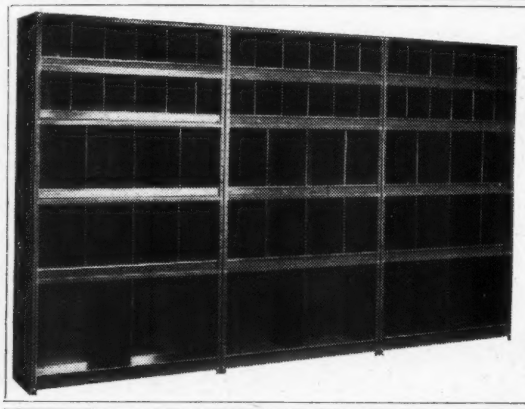

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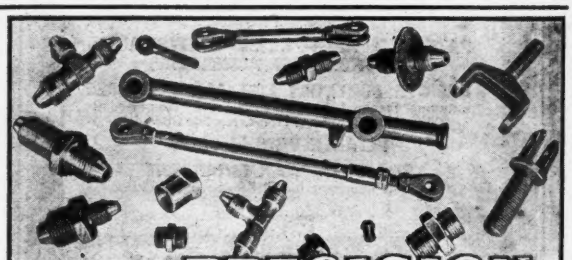

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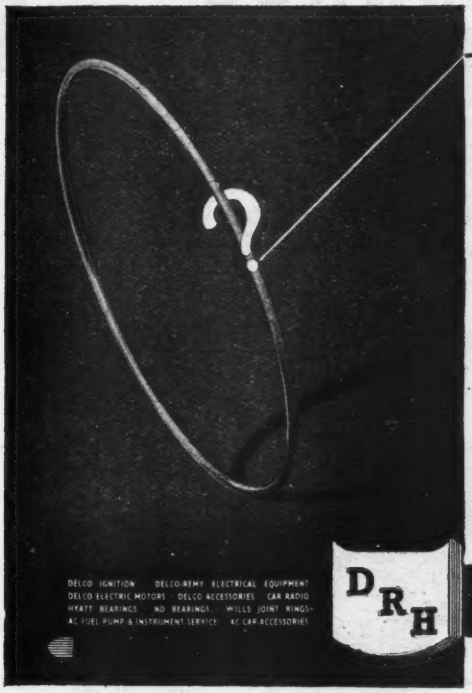
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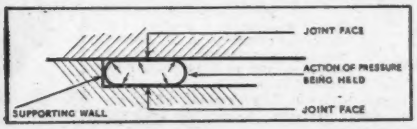

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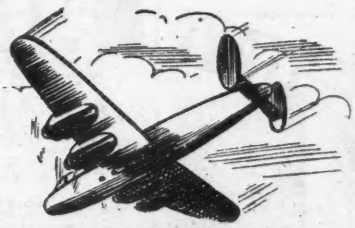

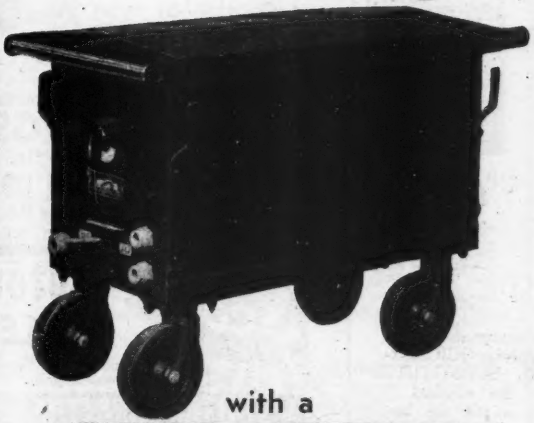

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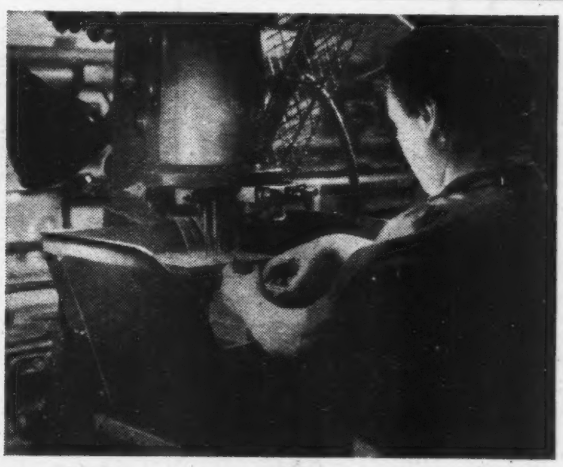

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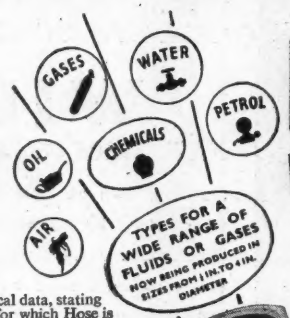

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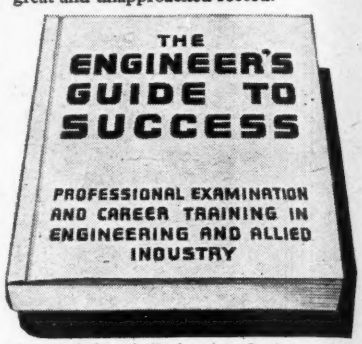

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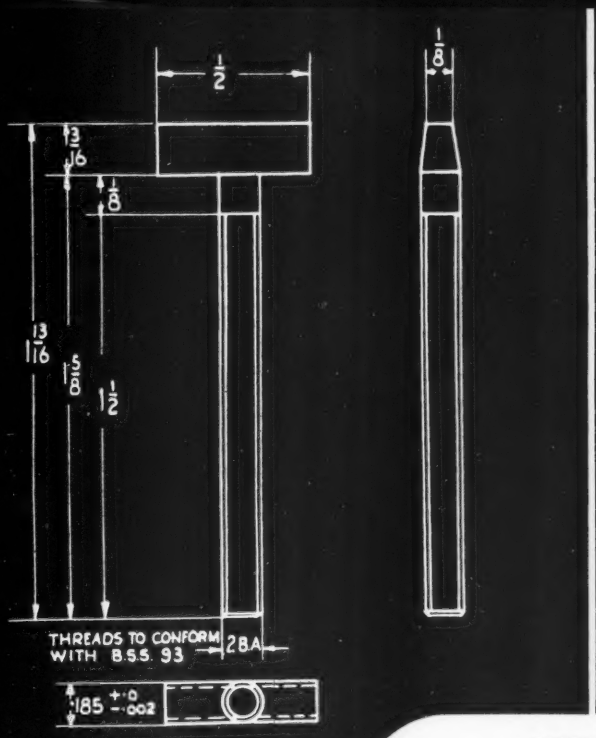

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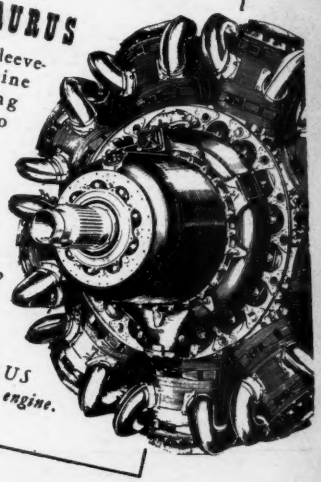

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